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ENDURES IN THE FIELD OF ANIMAL PRODUCTION
The evidence of fitness to practice veterinary medicine to the country's advantage (measured by the "service of supply") is based upon standards of veterinary education which modern nations seek to improve and thoughtful producers encourage and patronize.
The standard of fitness openly specified with the object of providing a worthy animal-disease control service for the country's livestock industry — long acknowledged to be a self-imposed decree of the better segment of producers — has been legally upheld, obviously on the ground that the voluntary exercise of common sense should prevail in the field of animal production.
IN THE FACE OF THE INSTINCT OF SELF-PRESERVATION AND THE SUBSISTENCE PICTURE OF 1945, ANIMAL HEALTH AND FOOD HYGIENE, IN INCOMPETENT HANDS, WILL NOT FOR LONG BE SANCTIONED BY THOUGHTFUL MEN.
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Hormonal Therapy in Relation to Veterinary Practice

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IT IS NOT the purpose of this paper to convey the idea that hormonal imbalance is the major factor in reproductive failure of farm animals. I believe that no one will contest the statement that infection is of major consideration in reproductive failures. Nevertheless, there are times when it is decidedly advantageous to resort to hormonal therapy in farm animals and I am sure that the veterinary profession is aware of this fact. Economic considerations, however, enter into the picture. For example, a general practitioner may find it economically unsound to employ a certain hormone on commercial herds, whereas it may be decidedly advantageous for the specialist to use the hormone on valuable breeding animals.

Certain terms are used in this paper and it may be well to define them at this time. Estrogen is the collective term used to designate those substances (stilbestrol, stilbestrol dipropionate, estradiol, estradiol dipropionate, and estrone) which will induce estrus. Progesterone is the term employed to indicate the chemically pure hormone secreted by the corpus luteum. Testosterone is used to designate the chemically pure hormone secreted by the testes. Pituitrin is the proprietary name of an extract of the posterior lobe of the pituitary gland. It contains two active principles: an oxytocic principle which causes uterine contraction, and a pressor principle which raises blood pressure. Gonadotrophins, or gonadotrophic hormones, are those substances that stimulate the ovaries and testes. There are several sources of such hormones. The blood serum of pregnant mares, at certain stages of pregnancy, contains gonadotrophins and such a product is usually referred to as pregnant mare serum. The urine of pregnant women contains a gonadotrophic hormone usually termed chorionic gonadotrophin. The anterior lobe of the pituitary gland contains two gonadotrophic principles: the follicle stimulating hormone and the luteinizing hormone. The lactogenic hormone refers to the principle of the anterior lobe of the pituitary gland which will initiate lactation in animals with suitably prepared mammary glands. Sexually mature nonpregnant animals that are not experiencing estrous periods are referred to as anestrous animals.

Many years ago, it was known that certain glands in the body were able to influence other parts of the body by secreting chemical substances and discharging them into the blood. In 1849 Berthold[1] showed that the testis was not dependent upon specific nerves to maintain its control of the secondary sex characters, but that its influence was exerted through the blood. Knauer[2] in 1896 demonstrated that grafted ovaries prevented the occurrence of castrate atrophy.

Experimental evidence[3] began to accumulate in 1897 which indicated that the nerves were not primarily concerned in stimulating the growth of the mammary

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gland and in the initiation of lactation. That there is a pituitary-gonad relationship was indicated by Fichera's work[4] in 1905 which showed that the pituitary enlarged after spaying or castration in guinea pigs, rabbits, cattle, buffaloes, and cocks. P. E. Smith[5, 6] conclusively demonstrated that the anterior lobe of the pituitary gland maintained and controlled the activity of the ovaries and testes and as a result influenced other reproductive organs. The rôle played in reproduction by the hormones secreted by the ovaries and testes is well founded.

Perhaps a brief sketch of the rôle played by hormones in reproduction might be in order. As an animal approaches sexual maturity, the anterior lobe of the pituitary gland secretes increasing amounts of the follicle-stimulating hormone and this induces growth of the ovarian follicle and stimulates spermatogenesis. The luteinizing hormone of the pituitary gland is essential for the secretion of testosterone by the testes. It appears that both the follicle-stimulating hormone and the luteinizing hormone are required to stimulate the ovary to secrete estrogen. Ovulation in the normal animal appears to be induced at a time when the level of the follicle-stimulating hormone in the blood is decreasing and that of the luteinizing hormone is increasing. The formation of the corpus luteum is under the influence of the luteinizing hormone. Its functional activity, that is, the secretion of progesterone, is dependent on the lactogenic hormone.

Estrogen prepares the vagina for the reception of the seminal fluid and, with progesterone, it prepares the uterus for the implantation of the fertilized egg. In most mammals, progesterone is essential for the continuation of pregnancy. In the male, testosterone induces and maintains the functional activity of the male genital tract.

HORMONAL THERAPY IN CATTLE

Anestrous Cattle. — Several hormones have been used rather extensively to combat functional sterility in cattle. Primary consideration has been given to those animals which fail to come into estrus. Such animals should be divided into two groups: (1) those with nonfunctional ovaries and (2) those with corpora lutea in their ovaries.

Let us consider the group having nonfunctional ovaries. Estrogens are being used more extensively in such animals than any other hormone. Claims are made not only for the induction of estrus but also for the initiation of the estrous cycle. This is a paradoxic situation, since repeated injections of an estrogen into rats result in ovarian atrophy.

In summarizing the more recent literature, I have noted 189 cows with ovarian inactivity which were injected with an estrogen. Eighty-five per cent of these cows came into estrus. In this same group of cows, there were 81 which were bred and subsequently checked for pregnancy. Sixty, or 74.0 per cent, of these 81 cows conceived.

English workers have reported favorable results from the use of estrogens in anestrous cattle. However, they present no data to substantiate their claims. Folley and Malpress[7] indicate that in most cases, a single intramuscular injection of 10 mg. of estradiol dipropionate or monobenzoate is sufficient to induce estrus in anestrous cows or heifers. Moreover, in most of their experimental animals, the estrogen treatment elicited a regular succession of estrous cycles, and conception usually resulted not from service at the artificially induced estrus but at a subsequent service. Montgomerie and Brownlee[8] reported that estrogens would induce estrus in anestrous cows and heifers. Animals of the small dairy breeds were injected with 10 mg. of stilbestrol dipropionate but in the heavier breeds 20 mg. were used. They indicated that a single intramuscular injection of stilbestrol dipropionate invariably results in estrus in a few days which is followed by a succession of normal cycles. Cows, and particularly heifers, nearly always conceived when mated at the first estrus after injection. Anderson[9] reported that 5 mg. of estradiol benzoate was highly effective as a single intramuscular injection for the induction of estrus in cows. Conception was obtained in a number of cases at the first estrus after injection.

These results appear to justify the use of estrogens as a therapeutic agent in anestrous cattle. Twenty milligrams of stilbestrol, 10 mg. of stilbestrol dipropionate, or 10 mg. of estradiol dipropionate seem to be an adequate dose. Repeated injections or an excessive dose should not be employed for they may cause cystic

ovaries.[10] One should never induce estrus with an estrogen and, after service, assume the animal to be pregnant just because estrus does not recur.

Gonadotrophic hormones have also been tried in anestrous cattle. Bhattacharya *et al.*[11] have shown that the subcutaneous injection of 1,500 international units of pregnant mare serum will induce estrus and ovulation, with estrus appearing on the second or third day after injection. They warn that larger doses should not be employed, since they may cause cysts to develop in the ovaries. Cameron[12] injected subcutaneously 1,000 I.U. of pregnant mare serum into 46 cows with dormant estrous cycles. This resulted in the induction of estrus in 21 of the 46 cows. One would not seem, therefore, to be justified in recommending the use of pregnant mare serum in anestrous cattle until more extensive studies are made to determine its effectiveness in causing estrus, and this followed by conception.

Chorionic gonadotrophin has also been employed in anestrous cattle, and with seemingly good results. In the early work, such a small dosage was used that it may be questionable just what part the hormone played in inducing estrus. Moreover, there appears to be little justification for the use of chorionic gonadotrophin in anestrous animals, since its action is similar to that of the luteinizing hormone of the anterior pituitary gland.

What consideration should be given to open cows with corpora lutea in their ovaries? In the first place, when an ovarian examination has been made in a nonpregnant animal and a corpus luteum has been found, only one point has been proved, the presence of a corpus luteum, Repeated examinations would be required in order to prove that the corpus luteum was persistent. The fact that some cows experience silent estrus justifies such a statement. Nevertheless, the veterinarian's job is to get cows into estrus.

Bennewitz[13] injected estradiol benzoate into 15 cows with persistent corpora lutea and 94 per cent of these animals came in estrus in one to seven days after injection. Other investigators have indicated that estrogens were effective in cows with persistent corpora lutea, but no data accompanied their statements.

Hupka and Majert[14] produced estrus in 7 of 10 cows injected with chorionic gonadotrophin. Similar results have been reported by other investigators. In all cases, however, exceedingly small doses have been used and there is a question of just what influence they may have had, if any. In addition, Zawadowsky *et al.*[15] have shown that even though chorionic gonadotrophin induces estrus, the newly formed corpora lutea, produced by the injection, do not take control of the cycle when an active corpus luteum is already present.

If any of you have been using pregnant mare serum in cows with corpora lutea in their ovaries, the warnings mentioned by Bhattacharya *et al.*[11] are worthy of attention. If the hormone is given when a corpus luteum is present, ovarian cysts may form. The hormone should never be injected in conjunction with the removal of the corpus luteum since multiple ovulations may occur with the danger of multiple births.

It would seem, therefore, that veterinarians should rely on their old method, that is, the manual expression of the corpus luteum, for the induction of estrus in cows with corpora lutea.

Cows Failing to Conceive after Repeated Service.—It is my belief that the greatest loss to the dairy farmer, from a reproductive point of view, is brought about by those cows which show fairly regular estrous cycles but either fail to conceive or conceive after repeated service. If this should be true, anything that could be done to decrease the required number of services per conception would be advantageous.

Bottomley *et al.*[16] injected a group of cows showing regular estrous cycles, but failing to conceive, with chorionic gonadotrophin. The treatment consisted of 3 intramuscular injections of 1,000 rat units given at two-day intervals, beginning on the day of service. Services of the experimental cows were classified as treated and untreated. Included in the group of treated services were not only the services at which the chorionic gonadotrophin injections were given but also the subsequent services, provided that the latter occurred within twenty-eight days. Of 30 treated services, 56.7 per cent were effective, whereas 6.9 per cent of untreated services were effective. The percentage of the treated services of the experimental cows which

were effective was similar to that of a group of control cows.

Asdell *et al.*[17] reported on an attempt to restore fertility in dairy cattle by treatment with an estrogen and gonadotrophic hormones. Cows with fairly regular estrous cycles were brought together under a uniform system of management. They were divided into control and experimental groups. Treatment consisted of the subcutaneous injection of 20,000 or 30,000 rat units of estradiol benzoate. If conception did not occur, an anterior pituitary extract was injected. In the control group, 50.0 per cent of the cows conceived and calved as compared with 42.9 per cent in the injected group. Anterior pituitary extract was more effective than was estradiol benzoate but with both treatments the percentage of conceptions was lower than in the controls.

Experimental results do not justify the use of hormonal therapy in cows experiencing regular estrous cycles but failing to conceive. I should like, however, to see additional experimental work carried out with chorionic gonadotrophin. It is my opinion that an anterior pituitary preparation, containing unknown quantities of the luteinizing hormone and follicle-stimulating hormone, is not indicated in such cases. Since Pincus and Kirsch[18] have shown that rabbits can be rendered sterile by injecting estrogen after ovulation, it is doubtful if a cow should be injected with an estrogen when she is in estrus and bred. Under such conditions, the fertilized ova are locked in the Fallopian tubes and do not enter the uterus.

Cystic Ovaries.—It is interesting to note that in 1915, Pearl and Surface[19] treated a cow that had taken on male secondary characteristics, both in behavior and structure, with an anterior pituitary substance. Repeated injections of a suspension of desiccated powder of the anterior lobe of the pituitary gland failed to bring about any change in the sex behavior of the cow. It is indeed remarkable that Pearl and Surface should have tried an anterior pituitary substance since at that time pituitary-ovarian relationships were not well established.

Tutt,[20] in reporting the full details of Williams' treatment of nymphomania in the cow by the injection of adrenalin chloride and pituitrin, suggests that the luteinizing hormone of the anterior lobe of the pituitary gland would be more likely to be of use. In this connection, the results of Deubler[21] are interesting. He injected, subcutaneously, 10,000 rat units of chorionic gonadotrophin into seven cows with cystic ovaries. These cows came into estrus in from ten to twenty-eight days after injection and conceived either from a service at that time or from a subsequent service.

Recently Casida, McShan, and Meyer[22] reported on the effect of sheep pituitary gonadotrophin upon cystic ovaries and nymphomania in cows. The extracts were prepared from acetone desiccated sheep pituitary powder and a dosage of 100 mg.-equivalents produced an average ovarian weight of approximately 78 mg. when injected twice daily for 4 1/2 days into 21-day-old Sprague-Dawley rats.

Ninety-six cows with cystic ovaries were injected intravenously with the extract, the amount injected ranging from 0.67 Gm.-equivalents to 2.5 Gm.-equivalents of pituitary powder. Eighty-one of these cows showed nymphomania when treatment was initiated and the symptoms disappeared in 72 after a single injection. Symptoms recurred in 14 of the 72 during the observation period. Six of the 14 recurrences were from a group of 12 cows that showed uterine or tubal pathology. Corpora lutea were formed in the ovaries of 74 of the 96 animals within thirty-one days after injection. Normal estrus occurred in 69 of the cows following a single injection and of 53 cows bred following a single injection, none of which showed evidence of uterine or tubal pathology, 36 became pregnant.

A second injection was given to 12 animals, either because the ovarian cysts persisted or because the cysts recurred sometime later. Seven of the 12 cows were bred and this resulted in six additional pregnancies. Therefore, of 53 cows receiving 1 or 2 injections, 42 became pregnant. Twelve cows showed some form of uterine or tubal pathology and although 6 of them were bred none conceived. And, finally, there was no correlation between the formation of corpora lutea and the length of time which the cows showed nymphomania before injection.

Attention is called to the fact that Clapp[23] has reported a tendency toward twinning in cows which are bred within

thirty-five days following the rupture of a cyst.

Retained Placenta.—At times, retained placenta is a serious problem in the dairy herd. Shaw[24] used posterior pituitary extract on 100 cows in a New England herd. From 4 to 9 cc. were injected, using 1 to 3 injections and these were made not later than one and one-half hours after parturition. One per cent of the injected cows retained the placenta, whereas 10.0 per cent of an untreated control group of 47 cows in the same herd retained their placenta. Fincher[25] employed an estrogen in conjunction with pituitrin. He injected, subcutaneously, 20,000 rat units of estradiol-benzoate and followed this immediately, or in a few hours, with a subcutaneous or intravenous injection of 5 to 10 cc. of pituitrin. Fincher concluded that this combination of hormones caused more violent uterine contractions than did pituitrin alone. It did not always satisfactorily reduce the degree of acute metritis or sterility that followed, although several cows so injected expelled the placenta promptly and functioned normally.

There are case reports in the literature in which the placenta has been expelled following estrogen therapy alone. Since experiments with adequate controls are yet to be conducted, it is not possible to say how effective estrogens are in causing placental expulsion. Certainly, there is no justification in using hormones as a preventive measure unless it be in families where there may be a tendency toward placental retention. The number of services required for conception following retained placenta may be a better criterion of hormonal effectiveness than placental expulsion.

Pyometra.—One finds glowing reports in the literature regarding the effectiveness of estrogens in cases of pyometra. On theoretic grounds, estrogens should be effective in such cases. Again the criterion of success should be the rapidity with which conception, followed by a normal pregnancy, takes place and not the discharge of pus from the uterus. Twenty-five milligrams of either estradiol dipropionate or stilbestrol dipropionate would appear to be an adequate dose. If stilbestrol is being used, it may be better to make 2 injections of 20 mg. each at a four-day interval.

Mummified Fetus.—If the placenta becomes nonfunctional at certain stages of pregnancy, the fetus is retained in the uterus and becomes mummified. The fetus is probably retained because the blood estrogenic level is not high enough to set in motion those factors operating at parturition. If such is the case, estrogenic therapy is indicated. The dose is 25 mg. of either stilbestrol dipropionate or estradiol dipropionate. When stilbestrol therapy is employed, it may be advantageous to make 2 injections with a four-day interval between. Following the diagnosis of a mummified fetus, one must not inject an estrogen and assume that the fetus will be expelled. Anderson and Bugg[26] injected a total of 305 mg. of stilbestrol dipropionate into a Jersey heifer carrying a mummified fetus without bringing about fetal expulsion.

Initiation and Maintenance of Lactation.—In 1937, Reece and Turner[27] showed that the injection of an estrogenic hormone into ovariectomized rats not only increased the lactogenic hormone content of the anterior lobe of the pituitary gland but that it also initiated lactation. Reports soon appeared showing that the administration of estrogenic hormones would initiate and maintain lactation in rats,[28] goats,[29-35] and cows[10, 29, 36, 41].

In the experiments with dairy cattle, the quantity of hormone used, the duration of treatment, and the mode of administration have varied greatly. The quantity of milk secreted has varied from negligible amounts[29, 37] to a peak daily production of 34 lb.[40] So far as I know, the best results obtained to date are those reported[41] on a 33-month-old barren Jersey heifer. This animal received a total of 273 mg. of stilbestrol dipropionate over a fourteen-week period. She produced 8,046 lb. of milk and 383 lb. of butterfat in 305 days. A 30-month-old Holstein-Friesian heifer that had failed to conceive following four services received a total of 60 mg. of testosterone propionate plus 163 mg. of stilbestrol dipropionate over an eleven-week period. This heifer remained in the herd for 346 days following the induction of lactation and in this period of time she produced 6,634 lb. of milk and 251 lb. of butterfat. The peak daily milk production was 27.5 lb. and at the time when the heifer was sold she was milking 16 lb. per day. Injecting a smaller quantity of hormone, either over a twelve-week period or over an eight-week period has resulted in

a lower level of milk production. Milking should not be delayed after the injection. It cannot be said which is better, to begin milking during the injection period or to begin milking after the last injection. At the present time, we are not milking during the injection period unless the udder "makes-up". Results with cows that have calved once or more have not been encouraging.

English investigators have carried out extensive trials with estrogens in cattle. Their results have not been published in detail; however, Parkes[42] has presented a summary in a review paper: "Implantation of tablets of diethylstilbestrol or hexestrol, totalling 2 Gm. to 5 Gm., into each of about 30 virgin heifers and dry barren cows resulted in widely different degrees of lactation. Daily milk yields were frequently greater than 2 gal. within two months of the start of treatment, while one cow showed a peak daily yield of 3 gal. and a year's total of 740 gal. Ovarian hypoplasia and nymphomania were usually associated with treatment, and pelvic fractures were sometimes encountered. In another series of experiments on about 60 heifers and cows, tablets of diethylstilbestrol or hexestrol were implanted to give a total dosage of 0.4 Gm. to 5 Gm. over thirty to two hundred days. In heifers, the udders became tense in about two weeks. The yield of milk rose, not always steadily, for forty days or more. The presence of a persistent corpus luteum, as in pregnancy, seemed to inhibit milk secretion. In the majority of heifers, the yield of milk approached what might have been expected in a first lactation. Removal of the tablets sometimes caused a considerable increase in milk yield, as did a single injection of 200 mg. of diethylstilbestrol in oil where the yield was abnormally low. The ovarian cycle was suppressed, but was resumed soon after cessation of treatment. Heifers, previously sterile, might get in calf during the induced lactation. Results with dry barren cows were much less satisfactory."

The results on the initiation and maintenance of lactation in cattle are promising indeed yet we know little about the subject. Experiments conducted to date suggest that estrogens should not be used on a heifer to bring her into milk production if you hope to get her with calf at a later date. Indications are that continued estrogenic treatment may cause cystic ovaries. Unless one's purpose is to terminate pregnancy, one should not inject an estrogen into a pregnant animal. More consistent results must be obtainable before one is justified in using hormonal therapy for lacational purposes in commercial dairy herds.

Danger of Either a Massive Dose or Repeated Injections of Estrogens in Lactating Cows.—Although estrogens will induce lactation in open heifers, they will not augment lactation in lactating cows. As a matter of fact, Reece and Murphy[43] have shown that the administration of a massive dose (50 mg.), or repeated injections of a smaller amount of stilbestrol dipropionate will decrease milk production. Frequently the quarters will produce flaky milk though such quarters are not necessarily infected quarters. An increase in milk chlorides is associated with the decrease in milk production.

Sterile Bulls. — Extensive experiments have not been carried out to determine the influence of hormones on the breeding capacity of bulls. Consequently, anything that might be said on the subject is more along the line of possible use rather than indicated use.

Bulls may be lacking either in sex drive or they may be producing spermatozoa incapable of carrying out their function. In either case, the breeding history of such bulls should be studied before resorting to hormonal therapy. If a bull has been used heavily, withdrawal from service should be suggested.

Unquestionably, testosterone has the ability to restore the sex drive of an animal but we do not know what any given dosage may do to spermatogenesis. If one does not make repeated injections, it is doubtful if there would be any harmful influence on spermatogenesis.

If a bull is producing semen with a low count, gonadotrophins may be of some value. The work of Bottomley *et al.*[16] indicates that such is the case. They restored the fertility of 3 sterile bulls by 2 intramuscular injections of 1,000 rat units of chorionic gonadotrophin given at a four-day interval.

HORMONAL THERAPY IN SHEEP

Sheep, unlike cattle, have a definite breeding season. Ewes come into the breed-

ing season the latter part of August or the first part of September and, in the absence of pregnancy, estrus will recur about every sixteen days[44] until December or January. The period of time from February to August, the time of sexual inactivity, is referred to as the anestrous period.

The discovery by Cole and Hart[45] of a potent gonadotrophic hormone in the blood of pregnant mares has led to a considerable amount of research work on the possibilities of augmenting fertility in sheep by hormonal administration. Cole and Miller[46] were the first to show that ovulation could be induced in the quiescent ovary of the anestrous ewe and that, under certain conditions, this was accompanied by estrus, mating, and conception. Ten out of 15 ewes receiving 2 injections at a sixteen-day interval mated and conceived. Subsequent work has shown varying degrees of success with pregnant mare serum. This is to be expected, since there have been a number of variable factors such as: (1) breed of sheep; (2) nutritional state; (3) time of injection, that is, early or late anestrous; and, (4) number of injections.

We[47] have obtained the best results when the ewes were injected in the early part of the anestrous period. At no time have lactating ewes been injected, since this would tend to complicate the picture. In the majority of cases, it has been necessary to make 2 injections of 250 rat units each of pregnant mare serum, with a sixteen-day interval between injections, in order to induce estrus. Since some of the ewes will breed following 1 injection, the ram's chest should be painted so that such ewes can be detected and not reinjected. O'Neal's work[48] indicates the necessity of injecting the rams if they are to have the desired sex drive during the anestrous season. In addition, McKenzie and Berliner[49] have shown that there is a marked drop in the potential reproductive capacity of rams following the onset of hot weather. Accordingly, we have always injected the rams with 500 rat units of pregnant mare serum about one week before the ewes were injected. Moreover, ewes conceiving in early anestrus have rebred during the normal breeding season and lambed again in the late spring.

Estrogens, both natural and synthetic, have been used to induce estrus in anestrous ewes. In addition, ovulation frequently occurs following estrogen administration. Hammond, Jr. *et al.*[50] injected 12 anestrous ewes with 0.25 to 1.0 mg. of stilbestrol dipropionate. Of these 12 ewes, 6 came in estrus and 6 ovulated. However, in only 3 of the 12 ewes were both estrus and ovulation induced. Three ewes received 0.5 to 1.0 mg. of estradiol benzoate and all of the ewes came into estrus and ovulated.

Estrogen administration induces not only an isolated estrus but also initiates the estrous cycle according to Anderson.[51] He found that the induction of estrus by estradiol benzoate started the estrous cycle in 73 out of 84 ewes which came in estrus within twenty-one days following injection. With successive cycles, the length of the interval between estrous periods tended to approximate more nearly the length of the interval between normal estrous periods. On the other hand, Frank and Appleby[52] failed to initiate the estrous cycle in 5 ewes in which estrus had been induced by stilbestrol administration. It is possible, however, that Frank and Appleby did not check their ewes for estrus for a sufficient period of time since Anderson observed that the length of the interval between the first and second estrous periods was twenty-six days. Quin and Van Der Wath[53] did not find stilbestrol very effective in ewes in late anestrus. Only 8 out of 43 ewes injected with 1.0 to 5.0 mg. of stilbestrol came into full estrus, while a further 8 ewes displayed poor and doubtful signs of estrus.

These results are interesting and add to our knowledge on the subject; nevertheless, the veterinarian will want to know: "What percentage of anestrous ewes injected with estrogen will lamb?" August[54] reported that the injection of 1.0 to 1.5 mg. of estradiol benzoate into ewes induced estrus. Out of over 4,000 animals treated, 72.5 per cent mated and 43.1 per cent lambed. An analysis of August's paper shows that 36.5 per cent, and not 43.1 per cent, of the injected ewes lambed. In determining the percentage of ewes lambing, August just ignored the flocks in which no lambs were born. Moreover, the injections were made at a time when mating was still occurring in nontreated ewes.

Experimental results, although encouraging, are not extensive enough to permit one to recommend the use of estrogens in

anestrous ewes to induce estrus, ovulation, and conception.

HORMONAL THERAPY IN GOATS

As the goat is a seasonal breeder, it is difficult to maintain a uniform milk supply. Hormonal therapy during the anestrous season offers some possibility of alleviating this condition. The work of Phillips *et al.*[55] suggests the following injection schedule for nonlactating goats: 200 rat units of pregnant mare serum and, if estrus does not occur, inject 400 rat units twenty days later. Larger doses appear to be needed for lactating does, around 600 rat units. The alternative is to initiate and maintain lactation by hormonal administration. That this can be accomplished with varying degrees of success, is indicated by the work of Lewis and Turner[30, 32, 34] and Folley *et al.*[29, 31, 33] Our best results have been obtained by making 8 weekly subcutaneous injections of 5 mg. of estradiol dipropionate.

HORMONAL THERAPY IN MARES

One of the most fertile fields for research in hormonal therapy in farm animals would appear to be a study of the effectiveness of gonadotrophins in precipitating ovulation at a definite time of the estrous period in the mare. The time of ovulation[56] is extremely variable when computed from the first day of estrus and this unquestionably accounts for much of the difficulty in getting mares in foal.

Mirskaya and Petropavlovsky[57] injected, subcutaneously, 500 mouse units of chorionic gonadotrophin into 68 mares reacting to the teaser and showing a follicle 1 cm. or larger in diameter. A similar injection was made eight to twelve hours later. Ovulation was effected in 68 mares thirty to forty-eight hours after the injection and 81 per cent of the mares foaled. An average of 1.4 services per mare were required. Day[58, 59] has noted ovulation in estrous mares twenty to forty hours after the intravenous injection of 1,000 to 2,000 rat units of chorionic gonadotrophin.

Pregnant mare serum appears to be effective in the induction of estrus in mares. Cameron[12] reported estrus in 9 mares, with dormant cycles, following the subcutaneous injection of a single dose of 1,000 I.U. Day,[59] however, was unable to induce estrus during the anestrous period (November-March) with either pregnant mare serum or horse pituitary extract.

GENERAL CONSIDERATIONS

Since many hormones are of a protein nature, it should be recalled that anaphylaxis is at least theoretically possible. Epinephrine has proved effective in the treatment of anaphylaxis. Because of antibody formation, repeated injections of a hormone of a protein nature may result not only in failure to obtain an increase in response but may actually result in a decreased response.

In reading the veterinary literature, one becomes somewhat confused on the terms employed. Consequently, further suggestions on terminology may be in order. The term "prolan" should not be used to refer to gonadotrophic extracts of the anterior lobe of the pituitary gland. If used at all, it should refer to the gonadotrophin in the urine of pregnant women. It is unfortunate that APL is used to represent "anterior pituitary lobe" since APL has been used for years to mean anterior pituitary-like, referring to the gonadotrophin present in the urine and placenta of pregnant women. Moreover, A.P.L. is the name of the commercial preparation of Ayerst, McKenna and Harrison.

There appears to be no justification for placing a hormonal product on the market without designating its activity either in biologic units or in milligrams of crystalline material. For example, stilbestrol dosage is recommended in cubic centimeters, whereas it should be recommended in milligrams.

And lastly, the veterinarian must be critical of the hormonal products which he uses. No other method will enable him to obtain better products. For example, do not select an extract that is supposed to contain a steroidal hormone, such as an estrogen, progesterone, or testosterone, which has been prepared by making an aqueous extract of an endocrine gland. Such hormones cannot be extracted by an aqueous medium. This does not mean that certain steroidal hormones cannot be marketed in an aqueous medium. In the use of an estrogen, if you are desirous of producing an immediate action and one of short duration, select a nonesterified estrogen such as stilbestrol. On the other hand, if you desire to have the action prolonged, select an esterified estrogen such as estra-

diol diproprionate or stilbestrol dipropionate.

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Brucellosis-Free Area Extended

Nine more counties in four states have been practically freed of brucellosis (Bang's disease) of cattle, according to the U. S. Bureau of Animal Industry. Designated as modified accredited bovine brucellosis-free areas, these counties in Alabama, Michigan, New Hampshire, and Virginia are to remain in the area for a period of three years before another test of all breeding cattle over 6 months of age is required. In the newly added counties there are approximately 74,700 such cattle.

There are now 600 counties in 22 states in the accredited status in which there are approximately 5,641,700 breeding cattle over 6 months of age. In 164 additional counties, in 16 states, officials and cattle owners are working toward accreditation under the area plan. Much more work could be done in eradicating brucellosis, if it were possible to meet all the demands from the cattle owners. Under present wartime conditions, it is difficult to make satisfactory progress.

Brucella vaccine is being used extensively as an adjunct in the control and eradication of brucellosis in cattle, and its use is increasing in practically all states. During the month of December, last year, 51,963 calves were vaccinated under official supervision in the federal-state coöperative work in 42 states.

Following is a list of counties, by states, that were accredited or reaccredited as of February 1 (*indicates reaccreditation for another three years):

STATE AND COUNTY	
ALABAMA	
*Lawrence	Madison
ARKANSAS	
*Fulton	*Pike
*Howard	*Sevier
GEORGIA	
*Clayton	*Coweta
*Cobb	
IDAHO	
*Clearwater	
MARYLAND	
*Calvert	
MICHIGAN	
Montmorency	
MINNESOTA	
*Cook	*St. Louis
*Itasca	
NEW HAMPSHIRE	
Belknap	Merrimack
Carroll	Stratford
WEST VIRGINIA	
*Doddridge	*Mason
*Harrison	*Ritchie
NORTH CAROLINA	
*Avery	*Henderson
*Brunswick	*Hoke
*Caldwell	*Jackson
*Carteret	*New Hanover
*Craven	*Person
*Currituck	*Robeson
*Franklin	*Sampson
*Greene	*Stokes
*Halifax	*Warren
NORTH DAKOTA	
*Benson	*Sioux
*Rolette	
PENNSYLVANIA	
*Indiana	
SOUTH CAROLINA	
*Bamberg	*York
*Chester	
TENNESSEE	
*Meigs	
VIRGINIA	
Prince Edward	Tazewell
*Sussex	Wise
WISCONSIN	
*Vilas	

Service of Military Veterinarians Acknowledged

A CENSORED dispatch from Paris received in February tells how trained veterinary officers and enlisted technicians, working in QM depots, cold storage plants, general hospitals, and the famous Pasteur Institute in Paris, are charged with the vital job of protecting the health of American troops against diseases transmitted through damaged, deteriorated, and contaminated foodstuffs. But let the reporter speak:

"Nearly 28 million pounds of perishable meat and dairy products were handled during the month of January alone," said Captain Donald J. Francisco, Dearborn, Mich., chief of the Veterinary Division of Seine Section in the Paris area.

This vast quantity of food received veterinary inspection on receipt, during storage, and prior to shipment to advance troops, and issue to troops in the immediate area.

Meet Trucks and Trains

Veterinarians virtually meet the truck convoys and trains, and newly arrived foodstuffs receive their first inspection upon receipt at a large quartermaster depot. The first sorting consists of selecting the obviously bad cartons and containers and, in the case of perishable foodstuffs, the setting aside of questionable cartons of beef, butter, or eggs for a more detailed inspection. Refrigerator vans and rail cars are checked for temperature, condition, and sanitation upon arrival and before unloading for shipment forward.

—*U. S. Army Signal Corps*

Frozen beef being unloaded from refrigerator ship to refrigerated vans for men at front lines. Work is being done at the port by Belgian labor under United States Army supervision.

SALVAGE FOOD

The salvable products are immediately issued to local troops or repacked for shipment to points further front. As a result of exacting inspection and prompt decisions, surprisingly small amounts of foodstuffs are lost. This and the advice on the proper methods in the storage and utilization of foodstuffs have also resulted in a financial savings to the government.

When foods are initially received, they are inspected for condition and sanitation. Seine Section veterinary officers and trained enlisted techicians advise and make recommendations as to whether it will stand up under long-term storage, whether it should be issued immediately, or whether it will be condemned as unfit for human consumption.

From the time a food is prepared in the United States until its reception overseas at a food depot, it will have been handled at least ten times. Veterinarians maintain a constant check at as many intervals as possible all along the way, to determine if the food can stand further shipment, and the length of time it can be expected to remain in good condition. Food finally issued to troops is thus assured to be in A-1 edible condition.

LOOK AFTER THE WAR DOGS

Veterinary officers also advise on the housing, care, and the feeding of dogs guarding vital supply and ordnance depots. Captured German horses now being used for draft purposes are also under the watchful eyes of the Army's veterinary service.

The JOURNAL is grateful for the opportunity of publishing the material furnished by the Publications Branch, Bureau of Public Relations, War Department, on the activities of the Veterinary Corps of World

—U. S. Army Signal Corps

Section where United States Army meats are stored in a refrigerated cave in France. These sections are kept at correct temperature by ammonia in the pipes.

War II, as the only irrefutable history is that written by the eye witness who sets it down then and there. The above dis-

—*U. S. Army Signal Corps*

A shipment of meat is inspected by Major Harry Lancaster (left), Salt Lake City, while Pfc. Clarence Sellers (right), Doerein, Ga., keeps the records at this port in Belgium.

patch from Paris as of February, 1945, tells more in a few words than pages written out of the imagination in years to come.

Food Inspection at QM Depot in Italy

Capt. Peter J. Germanio, a veterinarian of Centerville, Iowa, saves the Army thousands of dollars and the doughboys in Italy thousands of illnesses in his job as food inspector for a quartermaster food supply depot in the Mediterranean theater.

Captain Germanio inspects stockpiles of food valued as high as $68,000,000 for sanitation and preservation, and decides whether or not the food shows any evidence of spoilage after its long ocean voyage.

Another important part of his job is advising the quartermaster that certain food must be issued immediately lest it spoil. Acting on this guidance, his outfit, a quartermaster depot supply of Peninsular Base Section, has saved thousands of tons of food. In a year of operating in Italy, it has handled about three quarters of all the food entering that peninsula.

"In Africa," Captain Germanio says, "I inspected cattle being slaughtered for use by the Army in the same building that natives were slaughtering camels for consumption by Africans.

"That's what we came over for originally—inspection of slaughtered meat—but we also had necessary training to inspect all kinds of food and dairy products, so we went to work with the QM in outfits like this one.

"Sometimes we get into civilian veterinary stuff. Once, a farmer in Africa came in looking for a disinfectant for his hogs and it turned out he had 60 of them, some of which had contracted American cholera. That was an exceptional case. We quickly put a stop to it by ordering all 60 hogs slaughtered."

On another occasion, he ordered that concentrated chocolate rations, whitened from dry weather, be issued, if made into hot chocolate. Ordinary procedure would have made them a total loss.

"We asked for lacquered covers on canned products," he said, "and I imagine a lot of other veterinary officers in similar outfits around the world did, too. Anyway, we're getting the canned goods that way now and it means a lot in terms of the food this outfit handles. You can be sure we're doing everything possible to take good care of our rations. Each of the stockpiles has a gravel drainage surface and tarpaulins to cover anything that might tend to spoil because of weather. It's all part of our job."—*From Publications Branch, Bureau of Public Relations, War Department.*

Out of 62,012 flocks of chickens, containing 9,872,895 birds in nine states, infection was found in 1,242 of the flocks. The work on avian tuberculosis is conducted in connection with the tuberculin testing of cattle. Out of 147,346 cattle tested for tuberculosis, prior to interstate shipment, there were but 10 reactors.—*Chief A. W. Miller's Annual Report.*

Integrating the segments of the veterinary service into a solid task force, in the interest of national security, is among the unfinished business of the hour.

Some Aspects of British Wartime Veterinary Research

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VETERINARY work in Britain during World War II has inevitably been influenced by the general reorganization of British agriculture, which the events of the last few years have made necessary.

The position of the British veterinarian has been not unlike that of his Canadian counterpart, which was described by Lieut. Col. A. E. Cameron (*J.A.V.M.A., 104*, 1944: 189). The British veterinarian has, however, always to consider his relation to the veterinary needs of the British dominions and colonies, and his work in this sphere, even in peacetime, is all the more important because, as *Nature* (Jan. 8, 1944: 35) and Major John Smith (*Vet. Rec., 55*, 1943: 415, and *Nature*, Jan. 8, 1944: 60) and others have pointed out, the veterinarian is essential for the development of the pastoral peoples of some of these colonies.

He is no less necessary for the development of any nation's resources, for the food supplies of man can be so profoundly influenced by his work. As Sir J. C. Drummond, scientific adviser to the British Ministry of Food (*Vet. Rec., 56*, 1944: 76), speaking at London University, on nutrition and the Hot Springs Conference, reminded us, world production of food is not now, and never has been, adequate to meet world nutritional needs. The Hot Springs Conference, realizing this, tackled the tremendous problem of producing enough food for the whole world.

This may involve, Sir J. C. Drummond pointed out, the control of Britain's agriculture, as well as that of other countries, from a central source, possibly Washington. Such a control would probably be a matter of good faith rather than of regulations. Each area would produce the crops most needed by it and most suitable to it. But it is clear that such a plan would affect the work of veterinarians all over the world and, if it were controlled from Washington, British and United States veterinarians would inevitably be brought into closer coöperation.

From the Institute of Animal Pathology, University of Cambridge, Cambridge, Eng.

VETERINARY EDUCATION AND RESEARCH

In Britain, there were not, even before this war, enough veterinarians, and the report of the Loveday Committee on Veterinary Education (*H. M. Stationery Office*, 1938) formulated plans for the increase of their numbers and the improvement of their education, which have been revised recently in a second report (*H. M. Stationery Office*, 1944 and *Nature*, July 29, 1944: 125).

They may be compared with the ideas expressed by Wm. A. Hagan, D.V.M., in his recent discussion of veterinary education in a postwar world (*J.A.V.M.A., 103*, 1943: 269).

Prominent in the British plans is recognition of the need for university veterinary education, and for more and better research. The view is taken that no profession can prosper unless it has adequate facilities for research and advanced study. But it is not easy, during a war, which demands the maximum of effort from everyone, to find the time or opportunities for all the necessary research, and especially for the long-term research which is as essential as work on specific wartime problems.

The trend of British work has been, as Professor T. Dalling, director of the Ministry of Agriculture and Fisheries' veterinary laboratory at Weybridge, has pointed out (J. Roy. Agric. Soc. of England, *104*, 1943: 18), to study methods of disease control in order that the output of animal products may be increased. In a brief article like this, only a few of the fields in which work has been done can be noticed.

Little can be said, for example, in the limited space available, of the important work which has been, and is being, done at the Cambridge School of Agriculture by Dr. John Hammond on the improvement of pigs, cattle, and other stock, by breeding and other methods. Hammond's work is well known outside Britain. In a paper read to a conference of the Agricultural Education Association (*Nature*, Jan. 22, 1944: 116) on the breeding of cattle for milk and meat, Hammond emphasized the necessity of complete production records

extending over a number of generations if Britain is to achieve a supremacy in breeding for milk similar to that which she has attained in the breeding for beef production, and he expressed the opinion that the bulk of our beef must be obtained from dual-purpose cattle or from crosses of these with beef bulls rather than from pure beef herds.

ARTIFICIAL INSEMINATION

In a discussion on artificial insemination *(Vet. Rec., 56,* 1944: 210), Hammond also told us that an average of 800 to 900 gal. of milk has been obtained at Cambridge University Farm from animals which also bred good beef steers.

Professor Robert Rae, lately of Reading University, has given us his views on the improvement of British livestock *(Vet. Rec., 55,* 1943: 429). In the discussion following his paper, which was given to the National Veterinary Medical Associaton of Great Britain and Ireland, Col. E. M. Curley, chief veterinarian, European Theatre of Operations, United States Army, gave an interesting account of some aspects of United States veterinary work, and representatives of other nations also spoke on the work in their respective countries.

Livestock production will, Professor Rae argued, remain the chief feature of British agriculture after this war. Britain's Minister of Agriculture, R. S. Hudson, has recently endorsed this policy in a speech to farmers in Northern Ireland, and at Taunton in February, 1944, he also referred to the over-riding influence of livestock production which is needed to meet the world requirements of meats and fats *(Vet. Rec., 56,* 1944: 75).

It is this policy which has, in the past, created for Britain the reputation of being the stud farm of the world—a reputation which is, some authorities think (A. J. Henderson, *Vet. Rec., 56,* 1944: 207), being discounted, in North America at any rate, by improvements in breeding methods introduced by non-veterinary workers. The continuance of this policy of livestock production will, however, affect the trend of veterinary work in Britain in the future. It is, in fact, already doing that.

Last January, the British Society of Animal Production was formed, which is the counterpart of similar societies in the United States and other countries. An account of its inaugural meeting has been given by A. N. Worden *(Nature,* Feb. 5, 1944: 172). At that meeting, two papers endorsed the views of Hammond. W. S. Mansfield, director of the Cambridge University farm, discussed dual-purpose cattle and the necessity for long-continued line breeding, and W. A. Stewart discussed methods of rearing beef cattle and the necessity of increasing milk-producing qualities of British beef-breed cows.

This question of the improvement of livestock must inevitably be influenced by future developments in the technique of artificial insemination. Considerable progress has been made in the study of this subject in Great Britain. Experimental centers have been established at the universities of Cambridge and Reading, and others are being operated privately or are being organized. L. E. A. Rowson *(Vet. Rec., 56,* 1944: 165) reviews the work at Cambridge which began in 1942. In it, Dr. J. Hammond and Dr. A. Walton have played a prominent part.

The technique of artificial insemination is reviewed in Publication No. 11, issued by the British National Veterinary Medical Association. The British Ministry of Agriculture and Fisheries and the Secretary of State for Scotland have issued regulations to prevent misuse of it, and the Ministry of Agriculture and Fisheries and the Agricultural Improvement Council for Scotland have appointed Trials Supervisory Committees to control the work.

There is opposition to it among farmers, especially in Scotland, and this is discussed by A. J. Henderson *(Vet. Rec., 56,* 1944: 207) and by the speakers who discussed his paper. It is not difficult to understand such objections; many of them are due to imperfect knowledge and to a general opposition to progress. As Dr. Hammond has pointed out *(Vet. Rec., 56,* 1944: 210), if castration is admitted for the improvement of livestock, there should be no objection to artificial insemination on the ground that it is an interference with nature.

It is an important method used by the plant breeder, and in no country have more than four generations been produced by it. There is no evidence yet that it causes defects in stock, and there is no reason to think that the use of old sires will produce stock lacking in constitution. Neither is there any real danger of inbreeding, be-

cause each center must keep two stud animals of the same breed, and inbreeding is only bad when it is done with inferior stock.

To these replies by Hammond to the opponents of artificial insemination, A. J. Henderson *(loc. cit.)* added—in reply to those who objected that this practice might cause loss of confidence in pedigree breeding and consequent loss by Britain of foreign markets—that parentage tests based on the antigenic properties of the red blood cells can be made, and that, in any event, Britain is in danger of losing her reputation as being the stud farm of the world because of improved methods of breeding adopted, especially in North America.

The advantages of artificial insemination need not be emphasized in the United States, where much excellent work on it has been done. The early valuable Russian work has, as A. J. Henderson *(loc. cit.)* pointed out, been a valuable basis for developments in other countries. A. Foggie, discussing Henderson's paper, pointed out the important consideration that artificial insemination may be a valuable means of controlling disease. It could, for example, break the cycle of infection with *Trichomonas foetus* and thus help the control of abortion and sterility due to this cause. Its possible effects on other causes of abortion have yet to be assessed. Veterinarians who are concerned with it will probably find that they will require a sound knowledge of modern genetics if they are to succeed.

ANIMAL GENETICS

In Britain, work on animal genetics is being done at the Institute of Animal Genetics, Edinburgh University, and research on poultry genetics at the Animal Nutrition Institute, Cambridge University. The principles governing reproductive functions were discussed by J. Hammond *(Vet. Rec., 56,* 1944: 41) at a meeting of the Central Veterinary Society. J. S. Folley, of the National Institute for Research in Dairying, University of Reading, contributed to that meeting a discussion of the pituitary gonad-stimulating hormones. Dr. Folley has also discussed recent advances in lactational endocrinology as they are applied to farm animals *(Vet. Rec., 56,* 1944: 9). Space forbids a discussion of the vigorous work being carried on at various centers on sterility in cattle and horses.

Breeding, nutritional work, and similar methods must, however, be supplemented by efficient control of existing disease if permanent results are to be achieved.

ANIMAL DISEASES

In his annual articles on animal diseases in the *J. Roy. Agric. Soc. of England,* Professor T. Dalling, director of the Ministry of Agriculture and Fisheries' veterinary laboratory, Weybridge, Surrey, has outlined some of the main trends of British work on animal disease during the war.

Tuberculosis.—Of course, tuberculosis is always being studied. Control is being exercised partly by legislation and partly by encouragement of owners to maintain herds free of this disease. T. Dalling and others *(Proc. Roy. Soc. Med., 35,* 1942: 469) have discussed this question of control. R. E. Glover *(J. Hyg., Cambridge, 41,* 1941: 290) recovered fully virulent avian tubercle bacilli from cattle, and it has been shown that infection with avian tubercle derived from poultry or wild birds may cause cattle to react positively to tuberculin used for the detection of bovine tuberculosis. Some other infections also may do that. Both avian and mammalian tuberculin are, therefore, now used for comparative tests of herds.

This test is described by the Ministry of Agriculture *(Vet. Rec., 54,* 1942:192). The same issue of this journal (p. 191) contains a review of tuberculin testing written by Ministry of Agriculture representatives. J. N. Ritchie *(Vet. Rec., 54,* 1942: 395) has also reviewed this subject which is likewise discussed in the same journal's annual review of recent advances in veterinary medicine *(Vet. Rec., 55,* 1943: 209).

The properties of the acidfast bacillus found by Elton, of the Bureau of Animal Population, Oxford University, have been investigated by A. Q. Wells and W. S. Brooke *(Brit. J. Exptl. Path., 25,* 1940: 1041), and by S. A. Griffiths and T. Dalling *(J. Hyg., Cambridge, 40,* 1940: 573), and this work has suggested that vaccination with the vole bacillus provides better immunity than the B.C.G. vaccine.

Mastitis.—This disease is being studied at the Agricultural Research Council's Field Experiment Station, Compton, Berkshire; at the Hannah Dairy Research Institute, Ayrshire, Scotland; at the Royal

(Dick) Veterinary College, Edinburgh; at the Southeastern Agricultural College, Wye, Kent; and at Weybridge.

P. S. Watts, working at the Hannah Institute, has reported *(Vet. Rec., 54,* 1942: 181) on the milking machine as a factor in the incidence of mastitis and the same worker is studying with J. F. Malcolm, the etiology of this disease *(Vet. Rec., 56,* 1944: 227). A. W. Stableforth and his colleagues *(Vet. Rec., 54,* 1942: 539) rejected sulfanilamide as a routine method for the elimination of the organism concerned from the mammary gland, although it may be useful for the treatment of the associated clinical symptoms, if these are present.

Brucellosis. — At Compton, Weybridge, and also at other centers, brucellosis is being studied. Some British work done since 1921 is summarized in a communication from the Ministry of Agriculture *(Vet. Rec., 44,* 1942: 175) and in the annual review of recent advances in the same journal *(Vet. Rec., 55,* 1943: 193), also (ibid., *54,* 1942: 421) prints a Ministry of Agriculture communication on trichomoniasis in Britain.

Available information, this article says, indicates that the full extent and distribution of this disease are not yet fully known, but it probably causes losses of real significance. The clinical picture is variable and may be complicated by other coexistent infections, among which *Brucella abortus* may be important, especially if it is present in the latent form.

Trichomoniasis.—M. Robertson, member of the staff of the London Lister Institute of Preventive Medicine, working during the war at the Institute of Animal Pathology, Cambridge, has studied the development of serum agglutinins for *T. foetus.* She and W. R. Kerr, of the Stormont Laboratory, Northern Ireland, have developed the use of an agglutination test for the diagnosis of trichomoniasis, which has limitations but is definitely useful for diagnosis. W. R. Kerr *(Vet. J., 98,* 1942: 209 and *ibid., 99,* 1943: 4) has clarified our knowledge of the part played by the bull in the transmission of this disease. He emphasizes the fact that the bull is not proved free from infection if the cows served by him calve normally. Treatment of the bull is uncertain, but Kerr and Lamont, in Northern Ireland, have had considerable success with iodine solutions. Preventive work is, of course, of great importance.

Swine fever. — This disease is being studied, and T. M. Doyle *(Vet. J., 98,* 1942: 51) has found that the crystal-violet vaccine, recommended by United States workers, protects pigs against artificial and in contact infection. A high degree of protection was obtained by H. T. Matthews and T. M. Doyle *(J. Comp. Path. and Therap., 53,* 1943: 21) in a field trial of this vaccine.

Pining in Sheep.—British work on pining in sheep and its associated problems is described in *Technical Bulletin No. 5,* issued by the Imperial Bureau of Animal Nutrition (Rowett Institute of Animal Nutrition, Aberdeen, 1944). This work is too complex to be summarized here. In this bulletin also is a description of British work on "swayback" disease of sheep, which was carried out by J. R. M. Innes and G. D. Shearer, at the Institute of Animal Pathology, Cambridge.

J. R. M. Innes *(Vet. Rec., 55,* 1943: 369) has contributed a valuable summary of our knowledge of this and other demyelinating disorders which occur in Great Britain and other countries. It seems likely that the work on pining will lead eventually to a much better understanding of the mineral requirements of the ruminant. The study of "swayback" has opened up a field of investigation of mineral metabolism and the effects of intake of poisonous minerals and their release in toxic quantities under certain circumstances which is being studied by Shearer, at Cambridge.

The opinion of Sir John Orr, expressed in his foreword to the Technical Bulletin just mentioned, is that pasture is the most important world crop, excepting perhaps the cereals. The study of it may eliminate pining and the other diseases in other countries which are discussed in this bulletin.

The Importance of Pasture.—Pasture inportance in relation to animal health was brought out by a recent discussion on Pasture Improvement and Alternate Husbandry in Relation to Animal Health *(Vet. Rec., 56,* 1944: 186 and 195). This is a subject which is receiving much attention in Britain at the present time, as a part of the general plan to increase production. Sir George Stapledon, director of the Ministry of Agriculture and Fisheries' Improvement Station, near Stratford-on-Avon, opened this discussion with a statement of his views on the conversion of permanent pasture to leys on farmland proper, and on

the reclamation of rough grazing on sheep hill farms.

The possible effects of the policy outlined by Sir George on parasitic disease were discussed at this meeting by E. L. Taylor, Weybridge, who has made, in recent years, outstanding contributions to our knowledge of the relations of pasture ecology to parasitic diseases of farm stock *(Vet. Rec., 56,* 1944: 91, *ibid., 55,* 1943: 117 and other papers). If, said Taylor, we develop artificial increase of production we must also develop artificial control of disease. The resistance of stock to parasites must be increased by good feeding and other methods. Overcrowding, which is always a problem in a thickly populated country like Britain, must be avoided.

Taylor defines overcrowding as the number of larvae of parasitic nematodes per calory of nutrition (or the extent of infestation per unit of nutrition), and points out that it is not the number of square yards per animal that matters but the number of pounds of grass per animal.

Connected with this general problem is the work now being organized by the Institute of Animal Behavior—which is a biological and not a veterinary organization—on problems of animal behavior in relation to the diseases of farm stock. A beginning has been made with a study of grazing habits in relation to nutrition and disease, and further studies will include investigation of cardinal symptoms of animal disease by objective methods *(Nature,* July 1, 1944: 30), with the purpose of creating an objective clinical science which may make contributions to the study of disease in man and especially perhaps to the study of diseases of children who, like farm animals, cannot, when they are young, tell the doctor what is the matter with them.

VETERINARY-MEDICAL COLLABORATION

This kind of work introduces us to another aspect of British veterinary work; namely, its tendency towards coöperation with medical men. This is instanced by the existence of a section of the Royal Society of Medicine devoted to comparative medicine. Recently, a series of discussions was organized in this veterinary section of the limitations and uses of the comparative method in medicine.

The discussions on nutrition and endocrinology *(Proc. Roy. Soc. Med., 37,* 1944: 441) and on animal ecology and genetics *(ibid., 37,* 1944: 121) indicate the scope of this program, and further reports will follow.

Another aspect of this coöperation of the veterinarian and the medical man is recent work on blood transfusion. We have space to mention only the work of F. R. Edwards *(Brit. M. J.,* Jan. 15, 1944: 73) on the use of bovine serum to which formalin and ammonia have been added for human blood transfusion. Experts at Cambridge University collaborated with Dr. Edwards in this work. It is not anticipated that there will be any risk in this procedure of the transmission of either tuberculosis or *Br. abortus.* Further development of it should be interesting.

Another fruitful collaboration between medical men and veterinarians is the work being done by the Unit of Animal Physiology of the Agricultural Research Council, in the Physiology Department, of the University of Cambridge, on the digestion of the ruminant. A. T. Phillipson and R. A. MacAnally *(Biol. Rev., 19,* 1944:41) have recently summarized work on this subject. The recent demonstration by R. S. White and J. N. Oldham *(J. Comp. Path. and Therap., 54,* 1944: 1), working at the Royal Veterinary College in its wartime premises at Streatley, near Reading, that white spot liver of pigs is caused by the effects of the larvae of *Ascaris lumbricoides,* will have important bearing on the study of similar lesions caused by some nematode worms which infest man.

Fowl Paralysis.—There has been a fruitfull collaboration between the veterinarian, R. E. Glover and Dr. C. H. Andrewes at the National Institute for Medical Research, London. The combination of the experiences of these two workers in the study of disease as caused by viruses is having important results. In the study of fowl paralysis, Glover has worked independently and with Andrewes, and with F. Blakemore, of the Institute of Animal Pathology, Cambridge, where Glover was formerly a member of the staff.

To the study of fowl paralysis (neurolymphomatosis), Blakemore has made important contributions. They cannot be fully summarized here, but he has described *(J. Comp. Path. and Therap., 52,* 1939: 144) a disease in young chicks which he was able to produce by inoculation with sus-

pensions of tissues from typical cases of fowl paralysis. He concluded from his study of the lesions in all their stages that the disease which is called fowl paralysis or neurolymphomatosis is, in reality, the chronic form of an acute disease which he produced experimentally. The initial lesions are inflammatory and the chronic ones lymphomatous. Later (*Proc. Roy. Soc. Med., 34,* 1941: 109) Blakemore recorded the finding of similar acute lesions in flocks in the field and showed that the infective agent is filterable. Fowl older than 12 months are resistant to the infection. Blakemore points out that the early acute lesions could only be demonstrated by exalting the virulence of the virus and suggests that other workers may have failed to find similar lesions because they have worked only with material from fowl showing paralytic symptoms which appear later in the course of the disease.

C. H. Andrewes and R. E. Glover (*Vet. J., 96,* 1940: 427) have produced a similar disease in young chickens by inoculation with tissue suspensions from a turkey suffering from lympho-neurolymphomatosis.

F. D. Asplin (*Nature,* Feb. 26, 1944: 253), who was a few years ago a pupil of Blakemore's, at Cambridge, studied, at Weybridge, a number of strains of virus from paralyzed fowl and produced, by intraperitoneal inoculation of these into young chickens, lesions which were primarily necrotic and most conspicuous in the liver and heart. All the chickens were killed by the infection after five to ten days.

Asplin found that chickens treated continuously with sulfonamides, from the time of inoculation till they were killed for examination, did not develop lesions and that their tissues were not infective. Gross lesions were arrested by this treatment. Asplin treated 138 chickens, infected with 18 strains of the virus, with sulfadiazine in the food and none developed macroscopic lesions, while 101 of the 117 controls, infected but not treated, developed gross lesions.

Most of the sulfonamides in common use are effective in this way, but Asplin arranges them in the following order of descending value: sulfadiazine, sulfamezathine, sulfadiazole, sulfapyridine, sulfaguanidine. Sulfanilamide was too toxic for the chicks. As Asplin points out, most virus diseases have proved refractory to chemotherapy. He is studying the possibility of using sulfonamides as a means of control. Limitations of space do not permit discussion of the considerable amount of other work on chemotherapy which is going on at various centers, but an account of some of the work is given (*Vet. Rec., 55,* 1943: 194).

Coccidiosis.—A word should be said on British work on some diseases caused by parasites. At Weybridge, E. L. Taylor, C. Houghton-Smith, and E. E. Tuntle (*Vet. Rec., 52,* 1940: 829) have worked out a method of controlling coccidiosis of poultry by fumigation of the houses with ammonia. They have also found that daily doses of sulfamezathine or sulfadiazine, given in the food or water, will protect chickens which have been given, seventy-two to ninety-six hours before the beginning of this treatment, lethal doses of oöcysts of the coccidia causing cecal coccidiosis (*Vet. Rec., 55,* 1943: 109 and *ibid., 54,* 1942: 516). A more remarkable method of protection against coccidiosis, conceived on more original lines, may shortly be published.

Phenothiazine.—Taylor's work on the efficacy of phenothiazine, which he introduced into Britain for the control of nematode infestations, is well known. The coördinated trial of this anthelmintic on nematode infestations of a large number of lambs at Cambridge, Weybridge, St. Albans, and Edinburgh was organized and financed by the Agricultural Research Council. Its results, which include a statistical analysis by Professor R. A. Fisher, were published in *Joint Publication* No. 4, of the Imperial Agricultural Bureau (obtainable from the Agricultural Research Building, Penglais, Aberystwyth, Wales, price 3s.6d.).

This trial clearly established, on a statistical basis, the efficacy of phenothiazine for the control of certain nematode parasites. At Cambridge, a team of workers, financed by the Agricultural Research Council, is working on the mode of action of various anthelmintics and also on methods of testing their action. Certain substances likely to have anthelmintic action have also been synthesized.

One of the test objects being used for this work is *Nippostrongylus muris* of the rat, a supply of which was kindly sent by air early in the war to the writer, of the Institute of Animal Pathology, Cambridge, by Dr. Cort, of the Johns Hopkins University, Baltimore.

Apparatus for Testing Anthelmintics.—E. Baldwin (Parasitology, *35*, 1943: 89), working in the Sir William Dunn Institute of Biochemistry, University of Cambridge, has devised an apparatus for the *in vitro* testing of anthelmintics in which pieces of *A. lumbricoides* are directly subjected to the action of the test substances and their effects are recorded by a kymograph.

The results obtained by this method are recorded in this paper, but, since it was published, a large number of additional substances have been tested, and among these are several new compounds synthesized by Professor Friedmann.

Working in the same department as a member of the same team, A. R. Trim has evolved a method of estimating the penetration of anthelmintics into the nematode, which is described in his record of work on the action of hexylresorcinol (Parasitology, *35* 1944:209). Trim found, among other interesting results, that gastric mucin and bile salts and soaps markedly reduce the rate of penetration of hexylresorcinol into *A. lumbricoides* and that certain concentrations of sodium oleate markedly increase the rate of penetration. Most of the drug entered the nematode through the cuticle, and it is likely that little if any is taken in through the mouth. Trim has since studied the action of nicotine and other anthelmintics by similar methods.

Rogers, working at the Molteno Institute, Cambridge, University, in collaboration with Baldwin and Trim, has tested anthelmintics on rats infected with *Nippos. muris*, and has done valuable work on the metabolism of nematodes. Previously, he worked on these organisms at the Institute of Agricultural Parasitology, St. Albans, under Professor R. T. Leiper.

The aim of all this work is to attack the nematode as a scourge of all animals, including man, and thus to make a contribution of medical as well as of agricultural value.

INTERNATIONAL AID

This brief account of some of the British veterinary work is necessarily incomplete. There has been no space for reference to the assistance in education and research which has been given to the Polish, Czechoslovakian, and other European veterinarians, taking refuge in Britain. Nor has it been possible to refer to the work going on at the Moredun Institute, in Scotland, the Institute of Agricultural Parasitology, St. Albans, or the National Institute of Poultry Husbandry, at the Harper Adams Agricultural College, Shropshire.

The work of these and other institutions which we have not been able to mention is outlined in the Ministry of Agriculture and Fisheries' annual publications entitled *Agricultural Research in Great Britain*, which also outlines the whole organization of British agricultural research.

Enough has perhaps been said, however, to indicate that an outstanding feature of British veterinary research is the constant coöperation between all the research centers and the development of that team spirit which enables experts in all branches of inquiry, whether they be veterinary or not, to coöperate.

This team work will be developed in the future and it is likely that the existing cooperation with workers in other countries will extend. Every progressive mind in Britain will be pleased if this extension leads in due course to the creation of an international organization of veterinary research which will be the counterpart of international coöperation in other fields.

The era of competition for priority of discovery is already rapidly passing and it is to be hoped that, in the near future, all scientsts, whatever their nationality or field of inquiry, will form a brotherhood untroubled by rivalries and devoted to the service of man and all other living things.

Food Picture of 1945

The Bureau of Agricultural Economics, United States Department of Agriculture, indicates a total production of milk, in 1945, of 119 billion pounds, a billion more than in 1944; a meat production of 2 billion pounds (dressed weight) less than last year's, which was 24.5 billion pounds; and chicken production smaller, turkey production about the same. Fats and oils from domestic material, which amounted to the record figure of 11.2 billion pounds in 1944, will decline to around 10 billion pounds for 1945.

The wheat crop will be sufficient to cover all needs—food and nonfood. The Department of the Interior predicts new records will be set for fish taken this year.—*From Magazine War Guide, April-May, 1945.*

Collected Observations Pertaining to Hog Cholera

THE APPLICATION of the simultaneous serum-virus method of vaccination against hog cholera, introduced in 1908, established a means by which swine could be adequately protected against this malady. It constituted an outstanding achievement in preventive veterinary medicine. On the whole, it brought safety against one of the most damaging animal plagues. But, as in the instances of other methods designed to bring about an artificially induced immunity, undesirable results had to be reckoned with, now and then.

Among these results, the ones commonly referred to as "vaccination breaks" proved to be the source of the most disappointment, since in cases where such "breaks" were manifest, immunity either failed to be established shortly after vaccination or, later on, after exposure to the infection, hog cholera developed.

Veterinarians are wont to speak of early and late "breaks." It is quite probable that most of the former may be attributed either to faulty vaccination technique or to the missing of some animals in the larger herds. However, in the case of a number of these "breaks," such factors could be definitely ruled out.

Although it was recognized that a faulty vaccination could be held partially responsible for disappointing results, other factors also could be suspected. One of these, the possible influence of intercurrent *Salmonella suipestifer* (the cause of pig typhus) infection deserved consideration. It was frequently observed, in swine representing apparent vaccination "breaks" submitted for autopsy, that this microbe could be demonstrated in various organs. In only a limited number of such cases were lesions encountered such as are common in young pigs involved in pig typhus.

The causative microbe of pig typhus is responsible for a relatively high morbidity among juvenile swine and apparently it has an ubiquitous distribution in farm-hog herds. It would, therefore, be difficult to exclude it as a potential contributory factor in the etiology of so-called "breaks."

Most of the cases examined by the Department of Animal Pathology and Hygiene were swine weighing between 100 and 150 lb. They commonly showed a distinct enlargement of the spleen from which *S. suipestifer* could be recovered with a high degree of regularity. Independent of our own observation, the part played by this microörganism was also suspected by veterinarians, many of whom hesitated to proceed with the vaccination against hog cholera of young swine in herds in which pig typhus seemed to be prevalent.

Rather empirical observations related above served as warrant for an experimental attempt to determine whether or not the influence of intercurrent *S. suipestifer* infection may play a part in causing vaccination "breaks." These experiments were undertaken in 1939 and 1940. The work done in 1939 was largely for the purpose of orientation whereas the 1940 attempts were designed to secure data, permitting a more definite conclusion with regard to this vexing problem. [The bulletin is divided into five parts; namely, I. Salmonella Suipestifer in Vaccination "Breaks"; II. Excessive Serum Dosage as a Possible Cause of Vaccination "Breaks"; III. Experiments with Crystal-Violet Hog-Cholera Vaccine; IV. Experiments with Hog-Cholera Vaccine (Tissue Origin); and V. Phenolized Hog-Cholera Virus as a Possible Vehicle for Pathogenic Contaminants. The material contains generous comments and analyses of results which seem to put the final touch on what's what in hog-cholera immunization as of 1944.—Ed.]

The results of the controlled experiments, comprising 5 groups of 6 pigs each in one series and 36 pigs in another, used to study the relation of *S. suipestifer* infection and vaccination "breaks," we excerpt as follows:

> The results of the 1939 experiments do not reveal evidence to indicate that *S. suipestifer* infection interfered in any way with the resistance to hog cholera or with acquisition of immunity aimed at by serum-virus vaccination against hog cholera.
>
> Pigs that were exposed to *S. suipestifer* infection and died from this cause before their vaccination against cholera, as well as those

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Excerpts and abstracts from Research Bulletin 135, University of Nebraska, College of Agriculture, Agricultural Experiment Station, October, 1944, by L. Van Es and J. F. Olney of the Department of Animal Pathology and Hygiene.

which succumbed after this treatment, all showed, to an equal extent, the clinical and pathologic phenomena by which pig typhus is characterized.

Bacteriologic examination of 17 of the 18 pigs which died in the 1939 experiments consistently disclosed the presence of *S. suipestifer* in their organs. . . .

In the course of the 1940 experiments only one of the pigs which was vaccinated against hog cholera died of the disease two weeks after treatment and four days before the inhabitants of lot 2-4 had been exposed to *S. suipestifer* by means of contaminated feed and water. . . .

All other swine which had been gathered together in lot 2-4 successfully withstood the natural exposure to hog cholera to which they were subjected between October 23 and November 13 when the last one of the exposure controls died.

It did not appear from the 1940 experiments that the more or less constant exposure to *S. suipestifer* infection was at all sufficient to arrest or disturb the development of a substantial immunity to hog cholera in swine vaccinated with serum and virus.

On the other hand, it seemed probable that, after all, *S. suipestifer* cannot be ruled out with any degree of finality as a source of hogyard calamities. It is quite possible that such mischief may be attributed to the exaltation of the virulence of *S. suipestifer* by the simultaneous presence of hog-cholera virus, rather than to the cancellation of hog-cholera immunity on the part of the pig typhus bacillus. . . . There is reason to believe that, at least, a part of the so-called vaccination "breaks" was due, not to the cancellation of immunity to hog cholera, but to the innate capacity of *S. suipestifer* to produce disease with or without the help of the filterable virus.

In respect to excessive serum dosage as a cause of vaccination "breaks," the experiments showed that dosage at the rate of 1.72 cc. per pound of body weight may be an important factor in the cause of vaccination "breaks" as was also the case when but 0.2 cc. per pound of body weight were given. The safe dose is given as 0.43 cc. per pound of body weight. In the course of the 1943 experiments, 3 out of 20 pigs died of hog cholera, twenty-two to thirty-one days after receiving an excessive dose (1.72 cc./lb.).

CRYSTAL-VIOLET VACCINE

The experiments on crystal-violet vaccine indicated it to be a fair and promising product but by no means comparable to serum virus in respect to the duration and solidity of the immune state, although (quoting) "there can be no doubt that crystal violet has a decided attenuating influence on the virus of hog cholera. There seems to be reason to believe that this means of attenuation may eventually lead to the development of a true vaccine, the use of which would result in a stable and constant immunity in pigs treated with it." In an exposure of susceptible pigs to (crystal violet) vaccinated ones for thirty days, there was no evidence of any virus transmission.

HOG-CHOLERA VACCINE (TISSUE ORIGIN)

During the course of these experiments, a new type of hog-cholera vaccine appeared on the market. As encouraging result of its application were being reported and swine producers and veterinarians became curious about its value, a series of experiments similar to those for crystal-violet vaccine was undertaken. The vaccine used was that sold under "U. S. Veterinary License 52 (limited)", under stated expiration dates. Seven different samples were tested on 18 pigs and 9 controls in pen experiments in addition to two yard experiments. There was no systemic reaction. Of the 18 pen-treated pigs, 1 came down with hog cholera from a virus inoculation and 17 acquired a solid immunity. In only 1 of the pigs could freedom from reaction to the virus be observed. Summing up, the authors state that it appears probable that thirty days after vaccination, a complete immunity had not yet been fully established, in other words, resistance induced by the vaccine developed slowly, and they further suggest that immunity induced with the two newer vaccines (crystal-violet and tissue vaccine) may be of a transitory character, disappearing gradually. "Successful results," they add, "may depend upon actual exposure to hog cholera during the period when a measure of immunity is still available."

Swine erysipelas is now known to exist in Illinois, Idaho, Iowa, Kentucky, Missouri, Nebraska, North Dakota, Oregon, South Dakota, and Tennessee. Reports of Bureau veterinarians say that the disease is gradually spreading farther from the Corn Belt.

SURGERY & OBSTETRICS

AND PROBLEMS OF BREEDING

Abortion Following the Vaccination of Pregnant Cows with Strain 19

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CALFHOOD vaccination, when properly conducted, has proved its value as an aid in the control of brucellosis in cattle. The undoubted success of this measure in controlling abortions has apparently blinded many of its proponents to its contraindications and dangers. Too many livestockmen and even veterinarians are now indiscriminately treating with strain 19, *Brucella abortus*, vaccine all cattle of all ages and under all conditions without considering the confusion or actual harm which may result.

One undesirable result of vaccination is the positive agglutination titer, which is a handicap under conditions in which a negative test is required for the sale, exposition, or transportation of cattle. The agglutination titer resulting from the vaccination may mask an active infection or make its diagnosis uncertain.

A recent occurrence emphasizes this aspect of the problem. A nearby veterinarian was called in following abortion in a cow which supplied the milk for a family in which there were several children. The veterinarian suggested that the abortion might have been caused by brucellosis and advised vaccinating the cow, with which the owner complied. Some time later, the owner questioned the safety of using the milk, much to the embarrassment of the veterinarian. A blood sample was drawn and, of course, gave a positive agglutination reaction. An attempt was made to culture the organisms from the milk but with negative results. It was necessary to tell the owner that it was too late to determine whether or not the cow was infected.

The all-out advocates of universal vaccination stress the safety of the strain 19 vaccine. It seems to be true that there have been no authentic cases of transmission of strain 19, *Br. abortus*, from vaccinated to nonvaccinated cattle, but it is equally true that the introduction of the living organisms produces an infection in the vaccinated animals. This infection is usually mild and transitory but may not be without danger, particularly to pregnant animals.

Eichhorn and Crawford[1] warn that "pregnant animals should not be vaccinated with strain 19, since abortion has resulted in several instances following its experimental use in such animals."

Haring[2] reported that "in trials on animals segregated at the University of California it has now been shown that if strain 19 is injected subcutaneously into cows during advanced pregnancy it may produce typical brucellosis with transient bacteremia, and also exudative and necrotic placentitis with discharge of large numbers of the organisms in uterine material at the time of parturition."

By administering in the feed large doses of strain 19 organisms, Birch, Gilman, and Stone[3] produced typical brucellosis in 1 of 8 pregnant animals, from which *Br. abortus* strain 19 was isolated from the uterine exudate.

Danks[4] has recorded a case of orchitis in a bull, vaccinated a year previously, in which *Br. abortus* strain 19 was isolated from a testicle.

Several cases have been brought to our attention in the past year in which the available evidence seemed to incriminate vaccination of pregnant animals as the cause of

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abortion. In two such cases here described, the evidence seems to be complete.

On Jan. 28, 1944, a letter was received from a rancher in eastern Colorado describing an outbreak of abortions in his herd of Hereford cattle. He stated that in the previous October, a neighbor's dairy cow, known to be a brucellosis reactor, broke into his pasture and was bred by his bull. Although he had never tested his herd, he had no reason to believe that he had any infection in the herd and was naturally concerned over a possible transmission of the disease to his cattle. He finally decided to vaccinate his entire herd of 60 mature animals with strain 19 abortus vaccine. The vaccine was administered on November 6, at which time blood samples were drawn and sent to the brucellosis laboratory in Denver. The subsequent report showed them all to be negative to the agglutination test.

The cows were pasture bred, to start calving some time after February 1. The first abortion occurred on January 1 and by February 1, 16 premature calves were born dead and 3 more, although premature and weak, lived.

On February 4, a trip was made to this ranch and a recently aborted fetus was obtained and taken to our laboratory. From the stomach contents, a strain of *Br. abortus* was isolated which grew readily without the addition of CO_2 and which was found to be indistinguishable, culturally and morphologically, from a known culture of strain 19.

A final report on this herd in May disclosed that 23 premature calves were born dead, 3 premature calves lived, and 31 calves were apparently normal.

In another herd consisting of 56 purebred Herefords of various ages, all the cattle were vaccinated on Jan. 3, 1944. At the time of vaccination, blood samples were drawn and upon being tested, 2 cows were found to be reactors.

On March 9, 1 cow aborted a premature dead fetus, and a second abortion occurred on March 19. This second fetus was brought to our laboratory and from the stomach, a strain of Brucella was isolated without CO_2 which could not be differentiated from a known strain 19.

Two more cows in this herd gave birth to calves which were premature but living. The 2 reactor cows both had normal living calves.

Both the cultures isolated and suspected of being strain 19 abortus were inoculated into guinea pigs. In one month, blood samples from the 2 guinea pigs reacted in dilutions of 1:200 and 1:100, respectively. Two months after inoculation, the 2 guinea pigs were sacrificed. No significant lesions could be found and no organisms could be isolated from the liver or spleen of either animal.

From the cultural characteristics of both organisms and their failure to produce lesions in guinea pigs, in addition to the history of recent vaccination, it seems reasonable to assume that both the isolated cultures were of strain 19 origin and that the abortions were due to a vaccination infection.

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"Diseases of the Future"

The importance of keeping livestock sanitary science under the direction of the medically minded is shown in the present swine-erysipelas situation.

In 1923, or only twenty-two years ago, the *Eycyclopedia of Veterinary Medicine, Surgery and Obstetrics*, edited by George H. Wooldridge, F.R.C.V.S., M.R.I.A., F.Z.S., Royal Veterinary College, London, says: "Swine erysipelas in recent years has seemed to increase rather than decrease in Continental Europe. . . . . The chronic form exists in Great Britain and from time to time becomes more prevalent and more acute. Swine erysipelas is not known in the United States."

In 1944, the editor would have to say that *Erysipelothrix rhusiopathiae* has become one of the major disease problems of the American swine breeder. Whole sessions of the American veterinary associations are devoted exclusively to that one-time "disease of the future."

Cesarean Operation in a Heifer—Streamlined

The subject was a recently-bred 2 1/2-year-old heifer that fell 60 to 70 feet over the brink of a ravine, from which she was lifted with ropes and horses. At parturition, her pelvis was found to be undeveloped on account of the accident. The presentation was anterior with fore limbs folded back in the pelvic cavity. Although the malposition was corrected, the pull of three men failed to bring the head into the pelvic path. As nothing would have been gained by embryotomy, there was no alternative but to perform an emergency cesarean operation after inadequate preparation, and with total equipment consisting of a scalpel, a pair of scissors, suture needle and silk, iodine, cotton wool, procaine and 1 oz. of chloral hydrate—no hemostats. The chloral hydrate was given *per os* in a pint of water. The course of the 15-inch incision (made on the right side in the recumbent position) was bared with the scissors, swabbed with iodine, and anesthetized with 40 cc. of 5 per cent procaine (Hewlett's). The direction of the muscular fibers was ignored. The uterus was brought to, but not through, the incision and opened transversely with a 12-inch incision. The fetus was extracted by the hind legs and the afterbirth removed through the incision. Not having enough silk to close these long wounds, the lower half of the cutaneous incision was closed with grocer's twine. The operation appeared to be painless. It was performed at 8 p.m. At midnight, the heifer was lying comfortably and at 6 a.m. was up and eating hay. Commencing twelve hours after the operation, sulfanilamide was given *per os* for six days at the rate of 1 oz., three times a day. Although the sutures at the middle of the wound tore loose for a distance of six inches on the fourth day, healing occurred with but slight suppuration. In eight weeks, nothing but a bare area regrowing hair remained as evidence of the operation.—*R. F. Ross, M.R.C.V.S.: Cesarean Operation in a Heifer. Vet. Rec., 57, (Jan. 13, 1945): 16.*

Simultaneous injection of penicillin and antitoxin is a new treatment for tetanus.

First "Test Tube" Calf in Alaska

Dr. Earl F. Graves (KSC '27), territorial veterinarian, stationed at Palmer, Alaska, sends the accompanying picture and says:

"This historical baby is Tiny Tim, the Test Tube Tot, a pure-blooded Guernsey male calf born Sept. 1, 1944, at the Matanuska Agricultural Experiment Station, Palmer, Alaska. The calf, the result of artificial insemination, weighed 82 lb. at birth. The proud mother (inadvertently decapitated in taking the picture) is Tidewater Hazel No. 40894. The sire is Revilo Master."

—*From the Kennel Gazette*
Tiny Tim, the Test Tube Tot

"The cow had previously been bred repeatedly but would not conceive. Upon examination, there appeared to be a mass of tissue and blood vessels which hung from the vaginal wall. We inseminated artificially with semen from the bull at the experiment station and she conceived at once, went to term, and calved normally.

"We have attempted to inseminate with material sent by air from Chicago. So far, we have failed, although the semen was cold on arrival and sperm motility was high —and the cows in heat. We will try again."

Dr. Graves was the officiating veterinarian for the insemination procedure, and, we presume, for the accouchement also.

CLINICAL DATA

Clinical Notes

The Delaware Agricultural Experiment Station's poultry pathologist recommends sulfathiazole for controlling infectious coryza of chickens.

When land values soared after the last war, 100 ten-gallon cans of milk paid the interest on a $4,000 mortgage. By 1933, 250 such cans were required to meet the same obligation. Koepper *(Certified Milk,* Jan. 1945) warns farmers to judge farmland values by their longtime earnings, not the returns during war.

Though the time when penicillin will be available for use in veterinary practice is not now predictable, experimental work has already shown its value in the local treatment of bovine staphylococcal mastitis. The dose established by Klein, Grisman, and Moor (*Am. J. Vet. Res.,* January, 1945) is three doses of 22,800 Oxford units (subject to revision) injected at intervals of six hours.

Sensitivity of Bacillus Anthracis to Penicillin

Studies in connection with 3 cases of cutaneous anthrax without bacteremia (= wool sorter's disease), by Murphy, La Boccetta and Lockwood[1], showed that while *Bacillus anthracis* was sensitive to the action of penicillin *in vitro,* it was a hundred times more resistant to the same dose than a strain of *Staphylococcus aureus.* The trial, however, established penicillin as a valuable agent in the treatment of human anthrax. Rapid disappearance of *B. anthracis* from the local lesion was evoked from totals of 200,000 to 400,000 units given at the rate of 100,000 units per day—the minimum dose for effective response.

[1]Treatment of Human Anthrax. J. Am. Med A., *116,* (Dec. 9, 1944): 948-950.

Para-tertiary-butyl phenol (=butylphen), in doses of 0.1 to 1.0 Gm. per lb. of body weight, removed an average of 97 per cent of hookworms and ascarids and 74 per cent of whipworms from dogs.—*Rept. U.S.B.A.I., Oct. 14, 1944.*

The blood determination in horses of the total leucocyte count and the qualitative changes in the neutrophiles, which in some instances appear ahead of clinical evidence, was found to have prognostic and diagnostic value in surgical cases studied by Connor at the clinic of Iowa State College. —*From Am. J. Vet. Res. January, 1945.*

Working with pyrethrum and other insecticides, Roy and Ghosh *(Rev. Applied Entomol.,* December, 1944) proved by controlled experiments that, contrary to the popular belief that mosquitoes are killed by penetration of the poison into the cuticle, the route of penetration is the trachea and spiracles whence it permeates the insect's body. Experiments with ticks and flies supplied supporting evidence to that effect.

Defluorinated Phosphates

Owing to the shortage of bone meal and other phosphates for livestock feeding, considerable importance may be placed on the defluorinated rock phosphate and superphosphates produced by the Tennessee Valley Authority, which has been found to be almost a counterpart of bone meal, when subjected to a heat of 1,010 C. in the process of defluorination. Metaphosphates and pyrophosphates, heated to 600 to 760 C., gave results comparable to the poorer of the commercial products. The work was conducted by the Bureau of Plants, Soils, and Agricultural Engineering.—*From Report of the Bureau of Animal Industry, A. W. Miller, Chief, Oct. 14, 1944.*

Phenothiazine in Veterinary Practice

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PHENOTHIAZINE, or thiodiphenylamine, has been known as a dye to the chemists since 1885, when Bernthsen first synthesized it and investigated its chemistry.

It was not until 1934, however, when Campbell, Sullivan, Smith, and Haller[1] reported its toxic effect upon the larvae of culicine mosquitoes, that any biologic use was found for phenothiazine.

In 1938, Harwood, Jerstad, and Swanson[2] discovered that this organic compound possessed anthelmintic properties and reported upon its efficiency in the treatment of swine infected with ascarids and nodular worms.

Subsequently, it has been tested in the treatment of numerous helminthic infections in various animals, including man, and reports of its outstanding anthelmintic properties have been appearing regularly in the journals.

From the beginning, anthelmintic studies demonstrated that phenothiazine is a therapeutic agent of unusual promise. However, as is usually the case with a new drug, the claims made tended to be overenthusiastic. At first, the material was considered virtually nontoxic to the host, but as its administration became more widespread, cases of phenothiazine poisoning began to be reported in the literature. Consequently, the pendulum of opinion swung in the opposite direction and it was suggested that the drug was treacherous and unsafe to use in certain hosts.

ADMINISTRATION

Pure phenothiazine is a pale lemon-colored powder with a low solubility in water, estimated at 1:800,000; therefore it cannot be administered in measurable quantity in aqueous solution, nor can it be suspended in water without the addition of a wetting or dispersing agent. It is given as a bolus, in gelatin capsules, as a drench, in tablet form, mixed with the feed, and mixed with salt as a lick.

The chief criticism directed against the bolus, gelatin capsule, or tablet has been that the size is too great for easy administration to smaller animals.

If tablets are employed, a binding agent that permits the tablet to break up easily in the alimentary canal must be incorporated and a dispersing agent should be added. Swales[3] recommends a tablet made up as follows:

Commercial phenothiazine (95% pure)	80 parts
Starch	8 parts
Sodium bicarbonate	5 parts
Tartaric acid	4 parts
Sodium choleate	2 parts
Phenophthalein	1 part

Phenophthalein is added to counteract the constipating effect of the phenothiazine and, because of its laxative effect, to reduce the amount of phenothiazine absorbed.

Several specially prepared, relatively stable suspensions, usually containing about 40 per cent (weight per volume) of phenothiazine, to be employed as drenches are on the market. When drenches are administered, it must be remembered that if any of the liquid is spilled it will be converted to the red oxidation products of phenothiazine which are extremely fast dyes.

Most animals will take phenothiazine in the feed, but group feeding of the drug may be dangerous, since some animals, particularly those in a thriving condition, may ingest considerably more than their share of the material. Group feeding most certainly is unreliable as far as dosage rate is concerned. However, the administration of phenothiazine in the feed might be considered suitable for animals fed individually or where chemoprophylaxis is practiced.

The choice of any one of the ways of administering phenothiazine, giving consideration to the restrictions placed upon incorporating it into the feed, is determined by convenience, since results to date indi-

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cate that there is nothing to favor one over another.

THERAPEUTIC DOSAGE

The individual variation in susceptibility to phenothiazine poisoning appears, thus far, to be so great that one is not justified, at the present state of our knowledge of the drug, to quote a minimum lethal dosage, and a statement that a toxic dose is so many times an anthelmintic dose would be misleading. There are a number of cases in which doses of 500 Gm. have been administered to horses without the production of serious symptoms, but in other instances, small fractions of such doses have given rise to serious, and even fatal, results. General statements concerning the toxic effects of phenothiazine should be guarded and qualified.

Phenothiazine is listed in the seventh edition of the National Formulary with the following official dosages:

Horses and mules	30 to 50 Gm.
Cattle	50 to 80 Gm.
Calves	24 to 40 Gm.
Swine	5 to 30 Gm.
Sheep and goats	25 Gm.
Lambs (up to 60 lb.)	15 Gm.
Chickens	0.5 Gm.

Howell and Britton[4] report that in horses, small, repeated daily doses (1 to 5 Gm.) of phenothiazine, given until the full therapeutic dose has been attained, are efficient.

It has been suggested (Swales[5] and Whitlock and Cox[6]) that before dosing sheep with phenothiazine, the nasopharynx should be stimulated with 2.5 cc. of a 10 per cent copper sulfate solution to encourage closure of the esophageal groove so that the drug will pass directly to the reticulo-omasal orifice rather than be diluted by passage through the rumen and reticulum. An additional reason for such a procedure is that in heavily parasitized animals, the esophageal groove reflex is weakened and rumination is retarded. However, too much reliance should not be placed on reflex closure of the esophageal groove by copper sulfate; for Gordon[7] has shown that in sheep, up to 30 per cent may fail to respond to the stimulant, though on the average this number is usually about 12 per cent.

It has been claimed that phenothiazine possesses a marked advantage over copper sulfate and nicotine sulfate mixture (Cunic) in that with the former no preliminary period of starvation is necessary. This particular claim for superiority is hardly justified since the usual period of fasting preceding anthelmintic administration is not warranted. Swales[5] has produced evidence that there is no significant difference between the amount of ingesta in the abomasa of unfasted lambs and lambs fasted for twenty-four hours and personal experience of the writer with various anthelmintics administered to sheep has failed to reveal any significant advantage in starving the animals for twenty-four hours or less. For all practical purposes, fasting longer than twenty-four hours is out of the question.

Complete reliance in severe infections upon a single treatment with phenothiazine, or any of the other anthelmintics, is not justified.

SPECIFIC ANTHELMINTIC ACTION

Most workers report that in sheep phenothiazine is practically 100 per cent efficient in removing *Haemonchus contortus* and is less efficient, but still very good, against *Trichostrongylus axei, Ostertagia circumcincta* and *Ostertagia trifurcata.* All of these species occur in the abomasum. It is also extremely effective in eliminating adult nodular worms (Oesophagosotomum spp.) Swales,[3] Robertson,[8] and Peters, Leiper, and Clapham[9] have reported good results in Chabertia infections. Haberman and Harwood[10] and Swales[3] have indicated that when phenothiazine is administered in doses of more than 20 Gm., good results are to be expected in the treatment of infections with Bunostomum. Phenothiazine appears to be less effective against Trichostrongylus, Cooperia and Nematodirus species normally infecting the small intestine. Swales[3] and Taylor and Sanderson[11] have reported an efficiency against these worms of from 50 to 90 per cent, but the results recorded by Singer and Baker[12] and Stewart and Crofton[13] are not as good. Peters, Leiper, and Clapham[9] are the only investigators to report any effect against Strongyloides. No one has obtained positive results against Trichuris and the tapeworms.

Fewer experiments have been performed with phenothiazine as an anthelmintic for nematode infections of cattle than for those

of sheep, but comparable results have been obtained in the tests conducted. In cattle, as in sheep, the action of the drug is confined chiefly to nematodes of the abomasum, and the large intestine, as shown by Swanson, Porter and Connelly,[14] Taylor and Sanderson,[11] Porter,[15] Swanson and Carlisle,[16] Porter, Simms and Cauthen,[17] and Roberts.[18] There is some evidence that cattle are not as tolerant of phenothiazine as are sheep and, therefore, the dosage should be kept as low as possible, particularly in the treatment of calves.

The only trials which appear to have been made on goats (Taylor and Sanderson[11]) yielded results practically identical with those obtained on sheep.

Swanson, Harwood, and Connelly[19] reported that a dose of about 0.2 Gm. of phenothiazine per pound of body weight is more than 90 per cent effective in removing nodular worms from swine and is moderately efficient (50% or better) in removing mature ascarids. However, in the experience of the writer phenothiazine is of little or no value in the treatment of ascarid infections and most other workers have obtained similar results or at the best report that the action of the drug is highly variable or undependable against these worms. In their experiments on swine, Swanson, Harwood, and Connelly[19] reported no effect of phenothiazine on the stomach worms Ascarops sp., Physocephalus sp., and Hyostrongylus sp. or on the hookworm Crassisoma sp., the thorny headed worm *Macracanthorhynchus hirudinaceus* or the whipworm *Trichuris trichiura*. Roberts[18] recommends a dosage rate of 0.25 Gm. per pound of body weight for the treatment of nodular infections in swine. Higher doses, of the magnitude of 0.8 Gm. per pound of body weight, may produce toxic effects.

Phenothiazine appears to be, perhaps, the best anthelmintic yet discovered for the treatment of infections with strongyloid worms in the large intestine of horses, although in the writer's experience the actual lethal effect upon the worms has not appeared to be significantly greater than that of carbon tetrachloride. Its great promise, unfortunately, has been somewhat dimmed, and perhaps unjustly so, by occasional instances of toxic effects upon the host. Earlier workers set the dosage rate too high. This drug is also very effective against the stomach worm *T. axei* in horses. Pin worms (*Oxyuris equi*) are removed when dosages of 80 to 100 Gm. are administered (Howell and Britton[4]) but the efficiency is questionable and the dosage is dangerously high. Bots are unaffected by this drug and but relatively few *Parascaris equorum* are eliminated. Boley, Levine, Wright, and Graham[20] tried a mixture of 40 Gm. of phenothiazine and 24 cc. of carbon disulfide on each of 44 horses, following a 36-hour fast, and reported "a high degree of efficiency against ascarids and strongyles, as judged by egg counts, and many bots were also passed after treatment." It must be recognized that egg counts, unless they are made exactly and over a sufficiently long period of time, do not constitute a good criterion for determining anthelmintic efficiency.

The tests which have been conducted on phenothiazine in the treatment of canine helminthiases (Montgomerie[21] and Kauzal and Whitten[22]) have yielded negative results.

Little investigation has been undertaken upon phenothiazine as an anthelmintic for poultry. A dose of 0.5 Gm. has been reported as being very effective in eliminating *Heterakis gallinae* but, as would be expected, its action against *Ascaridia galli* is very slight. McCulloch and Nicholson[23] reported that administration in capsules, as should be anticipated, is more successful than giving the drug mixed with the feed.

Several workers have attested the superiority of phenothiazine over copper sulfate and nicotine sulfate (Cunic) and tetrachlorethylene against those nematodes toward which the efficiency of the former drug is high.

PROPHYLACTIC DOSAGE

Swales[24] recommends for prophylactic purposes in Canada, where the winters are sufficiently severe to kill off most, if not all, of the infective larvae of parasitic nematodes existing on the pastures, the treatment of adult stock with large single doses of phenothiazine before the animals go on pasture in the spring.

Habermann and Shorb[25] reported that placing phenothiazine-salt mixtures before sheep is of prophylactic value. In concentrations of less than 1:9 and more than 1 : 14, the animals do not consume enough

of the drug to affect adversely the parasitic larvae, but mixtures within this concentration range appear to be sufficiently palatable to permit the animals to satisfy their desire for salt and daily consumption of these mixtures contained enough phenothiazine to arrest the development of the larvae in the feces. Thus, consequent heavy "seeding" of pastures with infective larvae is avoided.

Britton, Miller, and Cameron[26] state that excellent prophylaxis has been obtained by placing before lambs a mixture of 1 part phenothiazine and 15 parts half ground salt. Severely parasitized animals should be given a full therapeutic dosage of an anthelmintic before being placed on a chemoprophylactic regime and phenothiazine should be employed prophylactically only at the time of year when the acquisition of infection is probable.

ADVANTAGES OF PHENOTHIAZINE

Probably the greatest advantage of phenothiazine over other known anthelmintics is the apparent safety with which it may be administered to pregnant animals, even those late in pregnancy, and to lactating animals. It is relatively nontoxic as compared with other anthelmintics.

DISADVANTAGES OF PHENOTHIAZINE

The greatest disadvantage in employing phenothiazine, particularly in sheep, is that the size of a single dose is large and bulky. It is relatively more expensive than Cunic tetrachlorethylene, or carbon tetrachloride and when it is given in a single large dose it stains the urine red, and consequently the wool.

CONTRAINDICATIONS

During the past several years, millions of sheep, thousands of horses and cattle, hundreds of pigs, and more than 200 human beings (reported cases) have received therapeutic dosages of phenothiazine and, similarly to the history of other chemotherapeutic agents, as the treatment has become more extensive, cases of poisoning have been observed. Nearly all of the instances of toxic reaction encountered in routine practice have been confined to horses, but other animals, including cattle and man, have shown toxic and even fatal effects. These toxic effects are at times clearly due to overdosing, but sometimes they appear to be due to susceptibility to the drug.

Too little is known of the toxicity of phenothiazine to permit a statement regarding the conditions which govern it. This organic compound is a poison and, like many other poisons, under certain circumstances its toxic properties are accentuated and under others virtually inhibited. However, we have only a vague idea of what its toxic effects are and at present we can merely list the facts which appear to be significant.

Young animals appear to be more susceptible to phenothiazine poisoning than older ones. Different species of animals vary in their susceptibility to the drug; sheep appear to be the most resistant and cattle and man the least resistant.

Lapage[27] found that some 3-month-old pigs manifested toxic symptoms, particularly ataxia, after one dose of 0.5 Gm. per pound of body weight. These findings were substantially corroborated by Roberts.[18] Rietz[28] has reported a condition which may have been a photosensitization effect in 8-week-old pigs which had been given 6 Gm. of phenothiazine, Swales, Albright, Fraser, and Muir[29] determined in White Yorkshire pigs that dosages of approximately 0.25 Gm. per pound of body weight would induce photosensitization if followed by five hours of sunlight.

According to Taylor and Sanderson[11] and Roberts,[18] cattle appear to be more susceptible than sheep or horses to the toxic action of phenothiazine. In Roberts' experiments, each of 8 animals given doses ranging from 0.16 to 0.8 Gm. per pound of body weight showed toxic reactions. In the lower dosage range, temporary inappetence and constipation were observed and in the higher range, severe abdominal pain and posterior incoördination occurred. One calf which received a dose of 0.5 Gm. per pound of body weight died.

Although sheep may be described as being almost definitely free from adverse effects of phenothiazine therapy, Holman and Pattison[30] observed that treatment with this drug increased the severity of the anemia produced by the parasitosis, but at the same time, general growth processes appeared to be stimulated. Taylor and Sanderson[11] produced toxic effects, terminating fatally in one case, by administering to sheep daily in the feed a dose of 10 Gm. for twelve days. Davey and Innes[31] report 3 fatalities in young lambs.

Phenothiazine in single doses of about 60 Gm. may cause fatalities in horses very occasionally (Wolfe and Dennis[32] and Schmidt, Christian, and Smotherman[33]). If horses are in poor condition, doses of 14 to 45 Gm. can produce serious results (Fincher and Gibbons[34]). In rare instances, apparently about one case in several hundreds if not thousands, a dose of 30 Gm. of phenothiazine may cause fatalities (Taylor[35]). Howell and Britton[4] report one mare treated several times during the course of a year and a half showing some evidence of photosensitization.

The effects of phenothiazine intoxication in horses are more or less uniform in all cases. There is oligocythemia; hemoglobinuria and albuminuria may be present, and icterus is common. Howell and Britton[4] advance the opinion that the constipating action of the drug itself is responsible for these symptoms and recommend that a constipating diet prior to phenothiazine therapy be avoided. At autopsy, the heart, spleen, and kidneys may be found to be greatly enlarged. Howell and Britton[4] account for this on the basis of local irritant action. There is urgent need for adequate pathologic examinations in cases of suspected phenothiazine poisoning in order that the effects of the drug on the body tissues may become more fully known.

The explanation of cases of phenothiazine poisoning being due to susceptible animals such as are found in any large population and to manifestations of individual variation in susceptibility is unsatisfactory because they appear to occur in groups and they occur with greater frequency than would be expected on these bases.

Drug idiosyncrasy does not satisfactorily explain the phenomenon. The symptoms of idiosyncrasy to drugs are nearly always different from those produced by overdosage. When toxic symptoms result from small doses of phenothiazine they resemble those of overdosage. Furthermore, it is extremely improbable that several idiosyncratic animals would occur at the same time in the same stable, as has happened numerous times in horse cases.

Davey and Innes[31] have adduced some evidence to show an apparent correlation between toxic effects and repeated small doses. Eddy, Cox, and De Eds[36] have shown that rats can successfully withstand a daily dosage of phenothiazine up to 0.25 per cent by weight of their diet for 295 days. Howell and Britton[4] regard small repeated daily doses less dangerous to horses than single large doses. McCulloch and Seghetti[37] administered to a pig weighing 110 lb. 30 Gm. of phenothiazine daily for forty-two consecutive days with only a resultant small reduction in hemoglobin concentration. The writer has given phenothiazine at the rate of approximately 0.5 mg. per gram of body weight to mice once a week for ten consecutive weeks. Postmortem examination failed to reveal any evidence of pathologic processes. Slight indications of anemia were observed. There were no indications of any urolith formation. Swales and Collier[38] have pointed out the possibility of the conjugate forming concretions in the urinary tract, although such an occurrence has not been noted during experimental work on phenothiazine.

The most plausible explanation of toxic effects resulting from usually safe therapeutic dosages of phenothiazine is an alteration of the normal low level of absorption and prompt excretion of the drug due possibly to some abnormality of the intestinal tract or more probably, in view of the incidence and distribution of the cases, to a dietary factor or factors.

In general, phenothiazine seems to be contraindicated in markedly anemic, cachexic, and emaciated animals and in constipation. It should be recognized that all of the nematodes against which this drug is definitely known to be effective produce these symptoms, with the exception of constipation, to a greater or lesser extent, particularly in acute infections. Howell and Britton[4] suggest that the contraindications presented by anemia, cachexia, and emaciation may be overcome by administering small, repeated doses of phenothiazine and a course of treatment with blood and digestive stimulants, and that constipation be relieved by laxatives. In treating animals which show signs of contraindications, it is advisable to determine the tolerance for the drug of a few individuals before treating the entire group. The use of defribrinated whole-blood serum has proved valuable in treating horses suffering from phenothiazine poisoning.

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Bovine and Human Tuberculosis

Under date of Jan. 2, 1945, Agricultural Research Administration, USDA, published a reminder that there is medical and veterinary evidence that the decline of bovine tuberculosis under the pressure of the campaign of eradication begun in 1917 "has been accompanied by a marked reduction in the extent of human tuberculosis." The facts related, as of the dawn of 1945, are extraordinarily complimentary to the veterinary profession. In two states (Georgia, Nevada) and the District of Columbia, no reactors were found in a recent check test involving more than 20,000 animals; in five states (Delaware, Idaho, Ohio, Oklahoma, and West Virginia), the incidence was less than 0.1 per cent; and the average for 48 states, Hawaii, and Puerto Rico was 0.21 per cent. For Mississippi, Montana, Tennessee, Maine, and Florida, the range was from 0.01 to 0.05 per cent.

The Primary Screw-Worm Fly, Cochliomyia Americana C. and P., as a Vector of Joint Ill in Calves

M. W. EMMEL, D.V.M., M.S.
Gainesville, Florida

With the introduction of the primary screw-worm fly, *Cochliomyia americana* C. and P., into the state ten years ago, joint ill, which had been almost unknown among beef calves on Florida ranges until then, began to appear. Its incidence did not reach alarming proportions until the past calving season. Loss of 5 per cent of the calf crop was not unusual. In one instance, 70 of 300 calves died. Losses from joint ill occurred in almost every section of the state.

The prevalence of screw-worm flies during that period was greater in many sections of the state than in preceding years. This was attributed to the mild winter and to the shortage of manpower, which prevented prompt treatment of screw-worm infested wounds.

Experiments were conducted to determine the microörganisms involved and the rôle played by screw-worm flies in the transmission of infection.

Cultures were made from the contents of the joint capsules of 16 calves on eight widely separated ranches. *Streptococcus pyogenes* was isolated in pure culture from the affected joints of 3 animals and also from the unhealed screw-worm infested navel of 1 of them; the remaining joint capsules were sterile. In no instance was the microorganism isolated when the joint capsule contained inspissated pus or when the contents of the joint capsule did not contain pus although the affected joint was enlarged markedly. It appears that the formation of pus in the joint capsule of some animals never occurs but intense inflammation of the surrounding tissues results in hardness, swelling, and lameness.

Either the knee, elbow, stifle, hock, or hip joint was affected. The incidence was greatest in the knee and hock joints and least in the hip joint. One joint was affected markedly and only in rare instances was a second joint affected in the same animal. Joint ill or "swollen joints," as it is called by cattlemen, developed when the animals were under 4 weeks of age. Reports indicated that approximately 75 to 90 per cent of the affected animals died from septicemia two to four weeks after becoming affected. Recovery in most instances resulted in a permanently enlarged or deformed joint. Screw-worm infestations of the navel had occurred in most of the calves which subsequently developed navel ill.

Experiments were conducted which showed that navel infection of calves under 2 weeks of age with *Str. pyogenes* (isolated from naturally occurring cases) with or without screw-worm infestation resulted in the development of navel ill or "swollen joints" within eight to fourteen days. Under range conditions in this state, cattlemen seldom use benzol to kill screw-worm but depend upon smear 62 or other commercial agents both to kill the larvae and to repel the adult flies. It was found that smear 62 did not disinfect a navel experimentally infected with *Str. pyogenes*. It also was found that the primary screw-worm fly is capable of carrying *Str. pyogenes* infection from an infected navel to a non-infected one, resulting in the subsequent development of joint ill. It is logical to assume that the larvae which hatch in eleven to twenty-one hours after the eggs are deposited on the edges of the wound carry the bacteria into the deepest recesses of the wound where probably their activities greatly enhance the possibilities of infection.

The fact that the adult fly is a vector for this type of infection and that the activities of the larvae probably aid and abet infection make the control of this pest of considerable importance during the calving season. The prompt treatment of unhealed navels, with or without screw-worm infestation, with tincture of iodine and a reliable screw-worm fly repellent and the persistent care of these wounds until completely healed is considered necessary for the control of outbreaks of joint ill described herein.

From the Florida Agricultural Experiment Station.

Human Brucellosis of Caprine Origin

Because goat breeding is a relatively minor industry in the United States, undulant fever of caprine origin was rather late in attracting general attention in the medical and veterinary professions in this

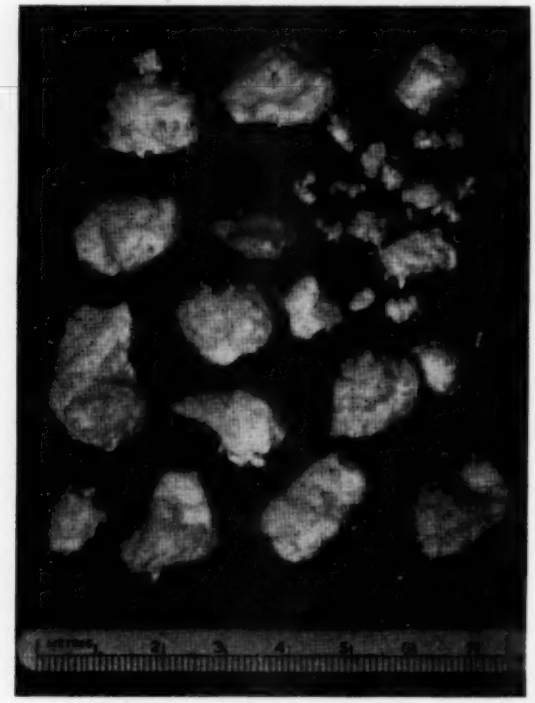


Fig. 1—Portions of feta cheese (a soft cured cheese made from raw goats' milk) submitted for bacteriological examination.

country. The disease was, however, long known and feared, for, in 1905, a shipment of 65 goats from Malta was quarantined, rejected, and destroyed on account of having been found to have brucellosis. A few weeks later, 8 members of the ship's crew who had drunk the milk of these goats developed undulant fever. In Texas, 19.4 per cent of a herd of 128 goats was found to be infected with *Brucella melitensis* in 1911, and 12 human cases were traced thereto, the same year. In 1922, the U. S. Public Health Service reported 35 human cases of caprine origin in Phoenix, Arizona. Veterinarians recall that State Veterinarian W. A. Stevenson, of Utah, died in 1923 from undulant fever, contracted in handling afterbirths of infected goats. Giltner, of the U. S. Bureau of Animal Industry, in 1934, following an investigation in the Southwest, contended that caprine brucellosis was a potential menace to human health. The 3,636 unclassified human cases in the United States in 1943, tabulated by the U. S. Public Health Service, lent force to Giltner's contention, since 339 of these were in Texas, 244 in California, 40 in Colorado, and 26 in Oklahoma. A survey of cheese making from goats' milk in southwestern Colorado, which had developed into a sizable industry there, revealed important facts concerning the incidence of infective goat cheese derived from the lowly bred and rather badly managed "brush goats" of that section. Of 19 samples of goat cheese examined, 8 were positive for *Br. melitensis* when injected into guinea pigs—an interesting fact in view of other cheese-borne infections coming to light.—*Geo. W. Stiles, Bacteriologist in Charge, Pathological Laboratory, U. S. Bureau of Animal Industry, Denver, Colo.: Brucellosis in Goats—Recovery of Brucella Melitensis from Cheese Manufactured from Unpasteurized Goats' Milk.*

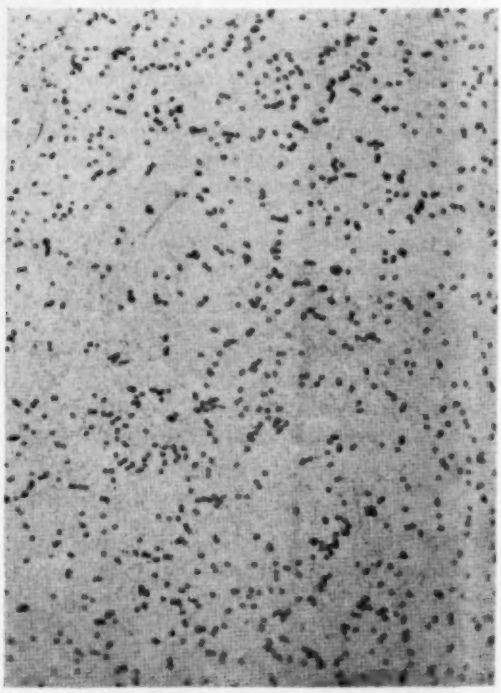
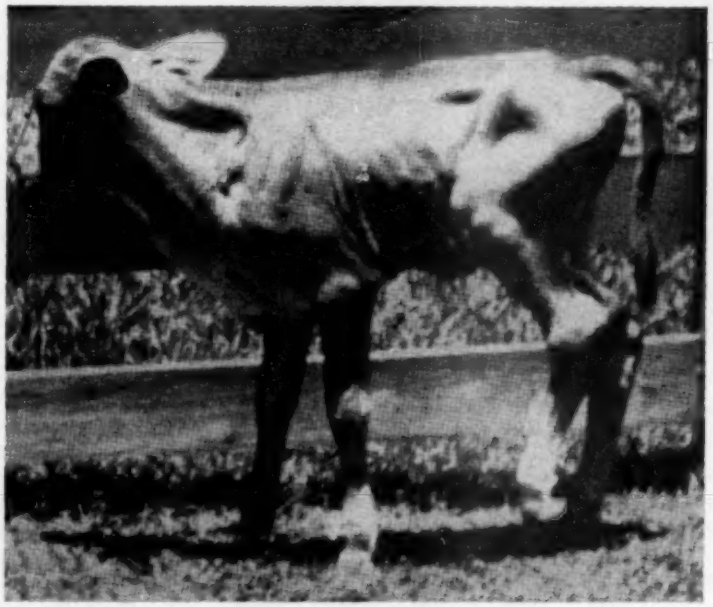


Fig. 2—Brucella melitensis organisms recovered from feta goats' milk cheese. x1300.

Abstract of a paper read before the seventy-fourth annual meeting, Colorado State Medical Society, Denver, Sept. 28, 1944.

"Swollen Joints" in Range Calves

A field survey was made of a condition commonly called "swollen joints", reported by cattlemen in many sections of the state (Florida) during 1944. The disease attacks mainly the carpus, elbow, tarsus, and stifle of calves under 4 weeks old. When multiple, one joint is more severely stricken than the others. The affected joints are hard, painful, intensely inflamed, and occasionally suppurate. The course is two to four weeks. Few calves survive. In the few survivors, recovery is slow. The muscles remain atrophied, the joints chronically stiff, and the leg distorted. The morbidity ranges around 5 per cent of the calf crop. On one ranch, 70 out of 300 calves died. None of the affected animals recovered. The survey revealed that screwworms were associated with 90 per cent of the cases. The other 10 per cent had a negative history in that respect. Sixteen calves, 2 to 8 weeks old, from widely separated ranches, were selected for study. All except 2 had a history of screwworms and, with the exception of 1, their navels were healing. The affected joints of the 16 animals and the unhealed navels were cultured for bacterial infection. Summed up, *Streptococcus pyogenes*, isolated from naturally and experimentally infected cases, identifies that microörganism as the agent responsible for "swollen joints", with or without screwworm infestation, even though not isolated from the pus of the infected joints. The infection of low invasive power does not cause immediate illness but localizes in the joints—points of low resistances—and there sets up an arthritis that is often suppurative. The author stresses the fact that infections of this type are responsible for the well-known pyemic arthritis (navel ill) of colts, which conforms to the same pathogenesis as this arthritis of calves, with the difference that the larva and adult screwworm fly, in the rôle of vector, may be an important etiological factor. The eggs deposited on the edges of the unhealed navel hatch in eleven to twenty-one hours and when the screwworm of larvae invade the wound, any bacteria carried by the fly penetrate its deepest recesses. The high incidence of "swollen joints" in 1944 was attributed to the mild winter and neglecting to treat screwworm-infested wounds promptly, owing to insufficient manpower on many ranches, together with an excess of screwworm flies due to the presence of hogs on the ranches.



"Swollen joints" affecting the left hock of a 4-weeks-old calf.

Preventive and curative treatment outlined consists of treating unhealed navels with tincture of iodine, screwworm fly repellents, and sulfa therapy if given early. Liniments may have slight value. Lancing the infected joint capsule is disapproved. —[*M. W. Emmel, D.V.M., University of*

Florida: "Swollen Joints" in Range Calves. Bull. 407, Florida Agricultural Experiment Station, February, 1945.]

Marie's Disease in a Tuberculous Horse

Cotchin *(Vet. J.* Dec. 1944) describes a case of hypertrophic pulmonary osteoarthropathy (=Marie's disease) in a 3- to 4-year-old gelding, which the postmortem investigation proved to be associated with organic tuberculosis. The author's review

—Courtesy of the Veterinary Journal

Periosteal bone deposits in a case of equine Marie's disease, after Cotchin, 1944.

of the literature shows that comparable cases have been described by McCall (1902), Lienaux (1909), Wirth and Plommer (1931), Nietsche (1933), Kukczyki (1933), Maly and Czernok (1933), von Groth (1937, 1938, 1939, 1940), and Jarmai and Móczy (1941). The osseous lesions involved the mandible, vertebrae, and limb bones, from which (as usual) the presence of the incriminating microörganisms could not be demonstrated. The bacteriological examination, on the contrary, revealed acid-alcohol-fast organisms in the bronchial lymph nodes and typical tuberculous lesions in the lungs, liver, and spleen. Photomicrographs and photographs of various bones are shown. The diagnosis was further confirmed by the inoculation of 2 guinea pigs and 2 rabbits.

Gramicidin S

Scientists of the Research Institute of Tropical Medicine at Moscow announce the discovery of a new antibiotic which they have named "Gramicidin S." It is produced from a species of soil bacillus of Russia that is comparable to *Bacillus brevis*, from which Dubos of Rockefeller Institute of Medical Research produced the original germicide of that category.

The advantages of the new product lie in its having a killing action against staphylococci, gram-negative organisms, and a variety of other bacteria, not possessed by gramicidin (=tyrothricin and tyrocidine). Moreover, besides being less selective and no more toxic than the original, the new antibiotic is analgesic. Its use on 1,500 cases in 10 hospitals is the bases of the report.—*From Drug Topics, Abstract from the Lancet.*

Penicillin Now Available to All Physicians and Hospitals

WPB announced on March 8 that penicillin would be available, as of March 15, to all hospitals and physicians through drug distribution channels. It will be released in vials of 100,000 units of sodium penicillin for human parenteral medication.

Last May, a civilian penicillin distribution agency was set up by WPB to control the limited quantities of the drug then available. Since that time, industrial production has increased tremendously. However, it is still not in sufficient supply to permit use in the many forms of manufactured pharmaceutical products already proposed. These developments will have to await greater availability of penicillin.

Although the supplies of the drug do not yet allow its release for animal medication, limited quantities have been made available to a few veterinary institutions where research projects are under way on penicillin therapy of certain animal diseases. It is anticipated that such investigations will be considerably increased in the near future.

Toxic Accidents from Sulfonamides

Of 1,936 patients treated with sulfonamides at the Cincinnati General Hospital, 116 (6%) developed toxic reactions. Occasionally, the treatment could be resumed by changing to another sulfa drug. The fatal reactions were renal, and they appeared without warning. Injury to the secreting portion or obstruction of the pelvis or ureter accounted for most of the troublesome sequels.

Human Brucellosis in the United States

From 1905 to 1924 (19 years), only 128 cases of undulant fever were reported in the United States. In 1925, 24 cases were reported; in 1930—1,420; in 1935—2,008; and in 1940—3,310. In Illinois, the figures were 5 cases reported in 1927; 63 cases in 1930; 144 cases in 1935; 175 in 1940, and 313 in 1944.

Though these figures are admitted to be incomplete, they serve to indicate the mounting recognition of a disease which, until the turn of the century, was practically confined to the island of Malta. Since Bang, Danish veterinarian, isolated *Brucella abortus* and Alice Evans, of the U.S. Public Health Service, established its relationship to *Brucella melitensis*, the story of brucellosis has been one of a valiant fight waged by physicians, veterinarians, public health workers, and dairymen.—*From Illinois Health Messenger, Feb. 15, 1945.*

Insect Killing with DDT

The amount of space allocated to the wonders of DDT, or dichloro-diphenyl trichloroethane (=chemical name), in the press and quasi-scientific magazines, is fast leaving the impression that insect life is about to suffer ignominious defeat at the hands of man, recalling the youthhood of bacteriology when everyone set out to sterilize the world. "On one bug-ridden island," avers one of these periodicals, "the Navy virtually exterminated all insect life in an hour." Simple as that. Inasmuch as the louse, flea, mosquito, tick, and other genera of the spineless do more man killing than robots, torpedoes, and Nazi cremations combined—besides nibbling at a lot of property (rugs, clothes, houses, plants, and animals)—singing the praises of DDT as a human blessing would be classical symphony, indeed. But, what the entomologists have not put over for general edification is the fate of an island when "virtually all of its insect life has been exterminated," seeing that they (the entomologists) would be loath to subordinate a principle of life to a temporary human expediency. Nature needs insects to carry on. Like the few pathogenic microbes that some of them transmit to higher life, insects, on the long pull, no doubt pay well for the damage they do. Being first of all a biologist, the pathologist doesn't lose his balance every time a new parasite killer comes along. The rôle of parasites in plant and animal physiology tempers his enthusiasm. The more effective a therapeutic agent is, the more should its use be restricted to scientific direction. The facts coming to light about DDT add proof to that effect.

Perthiocyanic Acid—Canine Tenicide

Perthiocyanic acid is an effective drug for the removal of tapeworms. For reasons of economy, dogs, rather than large animals, were used in testing the chemical for safety and effectiveness. Doses of 0.1 Gm. per lb. of body weight removed 37 Taenia (100%) from 3 dogs, and 78 Dipylidium (73%) from 8 dogs. The drug in these doses was well tolerated.—*Report of the Chief of the U.S. Bureau of Animal Industry, Oct. 14, 1944.*

Enter Sweet Potatoes as Stock Feed

Trials carried out in Louisiana have shown the remarkable potentiality of sweet potatoes in augmenting the dietary of livestock. The choice sweet potatoes are shipped for human consumption as such, seconds are canned or dehydrated, and the culls are dehydrated into a palatable stock feed. Moreover, the green vines from an acre yield 15,000 lb. of hay, equivalent, in feeding value, to alfalfa. Peelings and trimmings are dehydrated for stock feed, used for the extraction of carotene, or the making of pectin. The yield, having a much higher nutritive value per acre than corn, promises to step up animal production in the South.

DDT for Flea Infested Dogs

Preliminary tests of DDT against the fleas *Ctenocephalides canis*, Curt., *C. felis* Bch., and *Echidnophaga gallinacea*, Westw., on dogs made by Linquist, Madden, and Knipling (*J. Applied Entomol.*, Nov. 1944) gave interesting results. Powders containing 4 to 5 per cent of DDT in pyrophyllite were rubbed into the hair of 11 dogs, using about 10 Gm. for medium-sized animals. The species of Ctenocephalides began to

drop to the ground in ten to fifteen minutes. Some died on the dog but most of them left the host and showed the characteristic spasmodic twitchings of insects poisoned with DDT. Fleas watched individually died in three to five hours. *E. gallinacea* died on the host. The treated dogs were completely freed of fleas and were protected against reinfestation for four to seven days, while untreated dogs continued to harbor fleas, and rotenone-treated ones were protected for only two days. There were no toxic effects on the dogs.

A Cat of Rare Coloring

When a male, tortoise-shell kitten, marked with the three distinct colors (black, white, and yellow) characteristic of the type, was brought to the headquarters of The Anti-

Cruelty Society of Chicago, the knowing eye of Managing Director W. A. Young quickly spotted a rare feline specimen, for, of the hundreds of thousands of cats that have filed across his perspective in twenty years of humane work, there were no tri-colored males among them. Always (it was thought), genuinely three-colored cats are females. Male cats of gray, of alleged yellow, or of other blends, may seem to be three-colored to the casual observer but not to the connoisseur of *Felis domestica*. To the expert ailurophile, a tomcat of three unblended colors is truly a bird of rare plumage. Being so decorated, this kitten became a masculine Cinderella in a day, since he is now comfortably lodged in the Society's office, to the delight of the admiring public and the news-hunting cameramen of the syndicated newspapers, leading the life of a feline gentleman.

But, being first a veterinarian, Dr. Young is perturbed over a scientific explanation of the tortoise-shell coloring. The $64 question is "Why are the tortoise-shell colors peculiar to females?"

Penicillin in Bovine Mastitis

Experimental treatment of 46 cows for streptococcal mastitis, conducted by the U.S. Bureau of Animal Industry in coöperation with the University of Maryland, eliminated *Streptococcus agalactiae* in 58.8 per cent of 76 infected quarters, other streptococci in 48.5 per cent of 19 quarters, and staphylococci in 60 per cent of 5 quarters. The filtrate used contained from 68 to 95 Oxford units of penicillin per cubic centimeter. Cost: $610.15, pronounced sound in view of the benefits derived.

Boron in Fowl Coccidiosis

Since about 12 to 20 per cent of all chicks hatched in this country die of *Eimeria tenella* infection, the protection afforded by the use of sodium borate (borax) mixed in the chick mash at the rate of 2 per cent, reported by the U.S. Bureau of Animal Industry *(Rept. U.S.B.A.I.*, Oct. 14, 1944), is noteworthy. Elemental sulfur and a few sulfa drugs showed beneficial results, but these had disadvantages. On the other hand, 2 per cent of borax in the mash given through the fourth day provided nearly complete protection against experimental exposure, even though the administration was delayed until the third day after the exposure. Comparable results were obtained from 0.3 per cent of borax given in the drinking water. To warrant general recommendation of this boron treatment, further trials are suggested.

NUTRITION

MATERIAL FURNISHED BY THE COMMITTEE ON NUTRITION

The Amino Acids in Nutrition

ONE HUNDRED and twenty-five years ago the first amino acid was discovered by the French scientist, Braconnot. Ten years ago Rose, at the University of Illinois, discovered the twenty-second of these unique "building stones" of the proteins. The century between these two discoveries witnessed some of the most exciting achievements in the history of chemistry. Of major interest to nutritionists and biochemists, is, perhaps, that which took place in the brief span of eight years, beginning in 1930 with the classic experiments of Rose and coworkers.

These experiments, preceded by the pioneer studies of Osborne and Mendel in the United States, and Abderhalden and others abroad, crystallized the brilliant findings of historic research by elucidating, in terms of nutritional significance, the essential nature of some of these compounds and the indispensability of the remainder in the biochemistry of living organisms.

The amino acids and the proteins which they constitute occupy a unique rôle in nutrition. Unlike the carbohydrates and fats, which are utilized chiefly as fuel material, the amino acids are used mainly in the synthesis of living tissue. As Rose has remarked, "One of the most astounding attributes of living things is the unerring accuracy with which specific tissue components are manufactured out of the variable mixtures of amino acids circulating in the blood".[1] It is not surprising, therefore, that the nutritional rôle of the amino acids should have stimulated considerable interest among investigators in biochemistry.

EARLY INVESTIGATIONS

Although more than half of the accepted 22 amino acids had been discovered before 1900, little was known about their individual functions and actual distribution in food proteins. Therefore, it was not at first recognized that the nutritive value of a protein depends upon the nature of its amino acid constituents. Attention was focused on total protein intake rather than on the quality or type of protein ingested. As new chemical methods for the separation of the various classes of amino acids became available, knowledge concerning protein chemistry advanced rapidly. The relationship between amino acid composition and the nutritive adequacy of certain proteins finally became apparent, and it was soon appreciated that fundamental knowledge of protein metabolism could be obtained only through a knowledge of the behavior and biological significance of the individual amino acids.

Proteins.—With the realization of the basic importance of amino acids in elucidating protein biochemistry, attention was directed to finding out which of the known amino acids are indispensable and which can be excluded from the diet without interfering with normal physiological processes.

From 1912 until about 1930, a great many investigators worked on this problem. Although much information was derived from these early studies, the crude methods then available precluded the establishment of absolutely conclusive results. At that time, most of the amino acids were not available in pure form, so that it was not possible simply to remove and then restore one or more of these from the experimental diet and observe the results. Instead, diets were devised in which the sole source of nitrogen was supplied by a single purified protein known to be low in, or completely devoid of, one or more of the amino acids. If such a protein failed to maintain

Reprinted from *Borden's Review of Nutrition Research*, Vol. VI, No. 1, (Jan. 1945).

growth or life, and if the failure could be remedied by supplementing the diet with another protein containing the missing amino acid or acids, it was assumed that the supplementary amino acids were indispensable in the diet. A modification of this early procedure involved feeding diets containing hydrolyzed proteins (broken down into their component amino acids) from which certain amino acids had been removed as completely as available methods permitted.

The pioneer studies of Osborne and Mendel constituted basic research on the indispensability of certain amino acids. In one of their first experiments,[2] they demonstrated that rats could be maintained for several months on a diet in which wheat gliadin was the only protein. They observed, that the animals failed to grow on such a diet until the amino acid lysine was added.[3] This was the first conclusive evidence that lysine is indispensable for growth. In like manner, using the corn protein, zein, Osborne and Mendel[3] showed that not only lysine, but the amino acid tryptophane, or a source thereof, is also essential for animal growth. In the absence of either lysine or tryptophane, growth ceased and death eventually resulted.

Similar studies were conducted by numerous investigators on all the 21 amino acids then known. A complete review of these early studies has been given by Rose.[1] Although much presumptive evidence was presented during this early period for the indispensability of certain amino acids and the apparent dietary unimportance of others, evidence of a conclusive nature was reported for only three amino acids—lysine, tryptophane, and histidine, each of which was demonstrated to be absolutely essential in the diet of experimental animals.

Pure Amino Acids.—The use of known mixtures of pure amino acids in place of proteins in test diets permitted a more precise approach to the understanding of the nutritional significance of these compounds. This method of study was tried with dogs as early as 1912 by Abderhalden.[5] Sixteen amino acids were used in the diet but the animals failed to thrive, although they were successfully maintained in nitrogen balance for about a week. About four years later, Hopkins[6] reported that rats fed the amino acids cystine, tyrosine, lysine, tryptophane, and histidine (now known to be among the essential amino acids) as the only source of nitrogen could be maintained in apparent health for a long time and that they exhibited only a slow loss of weight. Replacement of these 5 amino acids by leucine, valine, alanine, glycine, and glutamic acid (only 2 of which are now known to be essential) resulted in rapid loss of weight and death of the animals. Similar studies were reported by Osborne and Mendel,[7] Mitchell,[8] Suzuki *et al.*,[9] and others. None of these experiments was entirely successful, although some light was obtained through them.

In 1930, the now classic experiments in Rose's laboratory were begun. At that time, 21 amino acids were known. Of these, 19 were used. The remaining 2 were unavailable. Also, they had been conclusively demonstrated to be unessential in the diet. Since the milk protein casein had long been used as the most successful source of dietary protein in experimental diets, the mixture of 19 amino acids was formulated in amounts closely approximating their occurrence in casein. Despite the apparent perfection of this amino acid mixture, the animals failed to grow and exhibited marked loss of appetite.[10]

Discovery of Threonine.—These findings led Rose to believe that the growth-promoting proteins contain at least one dietary essential other than the 21 amino acids then recognized, and that the nutritive failure of their animals on the synthetic diets was due to the absence of this unknown constituent. This hypothesis was confirmed by the observation that an immediate growth improvement resulted with the substitution of a small amount of casein, gliadin, or gelatin for an equivalent amount of the amino acid mixture.[11] Since casein seemed to be the most effective protein supplying the missing nutrient, it was selected for further study. The milk protein was hydrolyzed and the resulting amino acids separated into five different fractions according to their physicochemical properties. Four of these fractions showed little or no growth-stimulating effect. The fifth, or monoamino acid group, was found to be more potent than even casein. Unfortunately, the unknown substance was intimately associated with the essential amino acid, isoleucine, a fact of which the in-

vestigators were unaware. This greatly hampered the discovery of the unknown compound, for the crude active protein fraction when fed not only furnished the unknown, but compensated for any isoleucine deficiency as well. It took nearly four years for the "dual nature" of the unknown to be recognized and for it to be separated from the contaminating isoleucine.[12] With this accomplished, it was relatively easy to isolate and identify the unknown which was found to be a new amino acid.[13] Because of its close relationship to the sugar threose, the new amino acid was named threonine.[14]

Essential and Nonessential Amino Acids

While attempts were made to isolate the unknown growth essential, threonine, Rose and coworkers conducted a series of experiments designed to determine the nutritive importance of certain of the *known* amino acids. In these experiments, mixtures of all the known amino acids in pure form were used, plus a protein concentrate supplying the as yet undiscovered amino acid, threonine. By omitting one or more of the known amino acids, a nutritional deficiency could be expected if the amino acids in question were indispensable, and if the concentrate was not contaminated with them.

The first of these experiments dealt with the nutritive importance of phenylalanine and tyrosine.[15] These 2 amino acids are closely related in chemical structure and for many years had been thought to be mutually interchangeable in metabolism. They are of particular interest also because of their structural similarity to the important hormones, thyroxine and adrenalin. The experimental diets contained purified nutrients, vitamin supplements, the amino acid mixture, and the crude protein concentrate. The amino acid mixture, composed of painstakingly purified amino acids collected over a period of seven years prior to these experiments, was made to approximate the composition of casein, with the exception that phenylalanine and tyrosine were omitted. On this diet, the animals failed to grow. The addition of phenylalanine and tyrosine to the diet resulted in immediate marked gains in weight. The addition of phenylalanine alone resulted in growth equivalent to that obtained with both amino acids. The addition of tyrosine alone failed to prevent the rapid loss of weight observed on the original diet (chart 1).

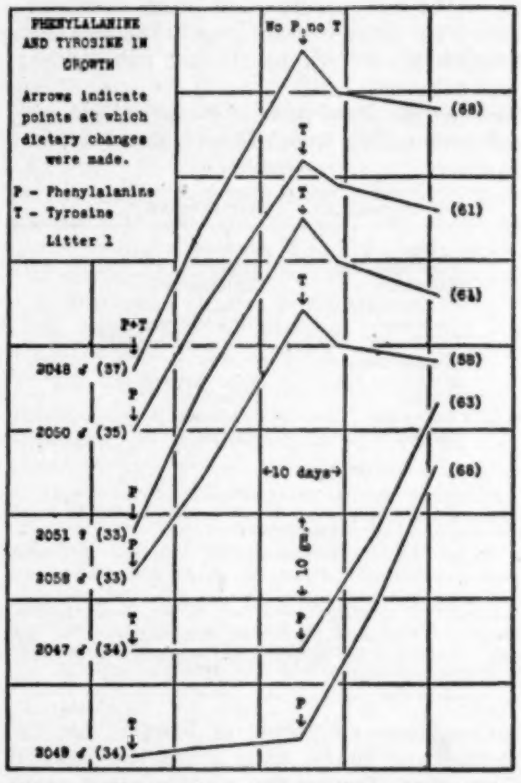


Chart 1.—The numbers in parentheses denote the initial and final weights of the rats.

The results demonstrated conclusively that phenylalanine is an indispensable dietary component. They also showed that tyrosine, despite its close chemical similarity to phenylalanine, is entirely unable to replace it. Thus, phenylalanine was added to the early list of indispensable amino acids, bringing the total at that date to 4 amino acids—tryptophane, lysine, histidine, phenylalanine.

In a similar fashion, experiments were conducted with the amino acids leucine, isoleucine, and norleucine.[16] When all 3 were omitted, nutritive failure and weight loss resulted. Addition of 1 of the leucines without the others failed to improve conditions. Of the 3 possible combinations of 2 leucines each, only that containing leucine and isoleucine was capable of supporting growth.

With the availability of threonine in pure form, the classification of the remaining amino acids was greatly facilitated. Even with this valuable advance, much tedious work remained to be done. Almost all of the amino acids had to be recrystallized from three to ten times to render them completely free of interfering substances;

Table 1.—Final Classification of the Amino Acids with Respect to Their Growth Effects in Experimental Animals†

INDISPENSABLE	DISPENSABLE
Lysine	Alanine
Tryptophane	Serine
Histidine	Norleucine
Phenylalanine	Aspartic acid
Leucine	Glutamic acid
Isoleucine	Hydroxyglutamic acid
Threonine	Proline
Methionine	Hydroxyproline
Valine	Citrulline
*Arginine	Tyrosine
Glycine	Cystine

*Arginine can be synthesized by the animal organism, but not at a sufficiently rapid rate to meet the demands of *normal* growth.

†Rose[1] has investigated the relative nutritive values of the optical isomers of the essential amino acids (except arginine). He reports that only the naturally occurring forms of valine, leucine, isoleucine, lysine and threonine are effective for the rat, whereas both isomers of tryptophane, phenylalanine, methionine and histidine are utilized.

correct isomeric forms of leucine, for example, had to be used since the natural form was frequently contaminated with methionine. Despite these difficulties involving extra work, time, and patience, the experiments proceeded at a remarkable pace and led to many surprising discoveries. Among these was the fact that cystine, long regarded by previous investigators as indispensable, could be replaced by methionine; also that lack of valine not only caused rapid weight loss, but unlike any amino acid heretofore studied, resulted in specific deficiency symptoms apparently related to the nervous system.[1]

By 1938, barely eight years after their initial experiments, Rose and coworkers had arrived at a final classification of the amino acids with respect to their indispensability as dietary factors *using growth response as the ultimate criterion* (table 1). Of 22 amino acids, only 10 were shown to be dietary essentials, while the remaining 12 could be dispensed with, without any adverse effects upon the growth process.

AMINO ACIDS IN HUMAN NUTRITION

A few years after the culmination of Rose's brilliant work in classifying the amino acids, interest arose in the direct investigation of human amino acid requirements and in the experimental study of possible amino acid deficiency symptoms in man. Maintenance of normal nitrogen balance served as the criterion for judging the essential nature of the amino acids under investigation.

Among the earliest of such studies were those reported by Holt and coworkers[17] at Johns Hopkins University. In the first of their experiments, four normal adult men were kept on a diet deficient in tryptophane for periods of two to five weeks. The experimental diet consisted of fats, starch,

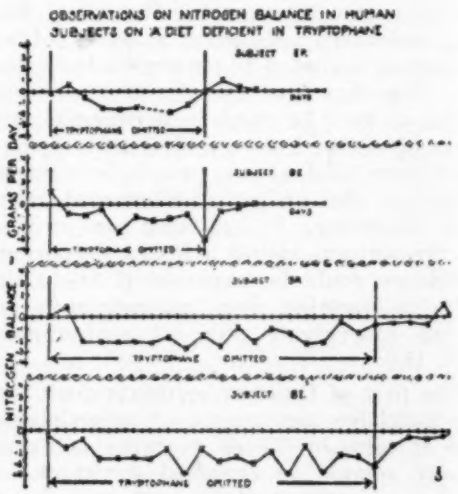

OBSERVATIONS ON NITROGEN BALANCE IN HUMAN SUBJECTS ON A DIET DEFICIENT IN TRYPTOPHANE
GRAMS PER DAY
NITROGEN BALANCE
TRYPTOPHANE OMITTED

Chart 2.

sugar, certain fruits and vegetables low in protein (tomatoes, mushrooms, carrots, asparagus, apples, oranges, etc.), and a synthetic vitamin supplement. Of the total nitrogen ingested, only 10 per cent was in the form of food proteins, the remaining 90 per cent being supplied as a mixture of pure amino acids devoid of tryptophane. A few days after the ingestion of the tryptophane-deficient diet, each of the subjects went into negative nitrogen balance. Within a week after the restoration of tryptophane to the diet, nitrogen equilibrium was restored in all cases (chart 2).

From this, the authors conclude that nitrogen equilibrium cannot be maintained in the dietary absence of tryptophane and

that this amino acid must therefore be regarded as a dietary essential for man.

In a similar experiment, the human need for lysine was also established.[18] Further observations on reactions during lysine deficiency brought out the unexpected fact that specific deficiency symptoms and a biochemical defect occur during lysine deprivation.[19] In addition to the occurrence of a negative nitrogen balance, the lysine deficient subjects all exhibited symptoms of nausea, dizziness, and hypersensitivity to metallic sounds five days after being on the experimental diet. The only detectable abnormal biochemical sign, aside from the negative nitrogen balance, was a marked increase in the urinary excretion of nonketone organic acids. This biochemical defect appears to be characteristic of lysine deficiency, not having been encountered in deficiencies of any other amino acids studied by these workers. The investigators point out, however, that abnormal excretion of organic acids of this type have been reported by other workers in cases of pneumonia, nephrosis, malnutrition, rickets, premature infants, etc., and therefore speculate upon the possibility that an abnormality of lysine metabolism may occur in these conditions.

In another experiment with arginine, Holt *et al.*,[20] demonstrated that this amino acid appears to be a dietary essential for the male, normal spermatogenesis being maintained only when arginine was present in the diet.

In 1943, Albanese, Holt and coworkers[21] reported additional amino acid studies with man using methionine and cystine. Using their routine procedure they demonstrated, on the basis of maintenance of nitrogen equilibrium, that methionine is a dietary essential for man. The dietary importance of methionine, aside from its rôle as an essential amino acid, has also been pointed out by du Vigneaud *et al.*,[22] who demonstrated its ability to serve as a source of essential labile methyl groups. The results obtained with cystine were not conclusive concerning its essentiality in the human diet. Clinical studies were made on the subjects to determine any possible objective deficiency symptoms, but results of these have not been published.

While the studies at Johns Hopkins were in progress, work was continuing at Rose's laboratory at the University of Illinois. Following up their animal studies in which it had been shown that only 10 of the 22 generally recognized amino acids are essential for growth and maintenance, they decided to maintain human subjects on a diet in which more than 95 per cent of the nitrogen was furnished by these 10 amino acids. They found that with a daily nitrogen intake of about 7 Gm., normal nitrogen equilibrium could be maintained. The fact that this low level of nitrogen intake (roughly 45 Gm. of protein),* supplied chiefly as the ten amino acids, readily supported nitrogen equilibrium, led them to conclude that the remaining 12 amino acids dispensable for animals are also dispensable for man. Their investigations, therefore, centered on the rôle of the 10 amino acids known to be essential to animals.

This work has not yet been reported in detail, but some preliminary reports have appeared. In the first of these,[23] valine was removed from the experimental diet described and the other amino acids increased correspondingly to provide a constant nitrogen intake. Immediately, each subject manifested a negative nitrogen balance. Restoration of valine to the diet resulted in a rapid reëstablishment of nitrogen equilibrium. Similar, though not as marked, behavior resulted when methionine was removed from the diet. It was concluded, therefore, that both valine and methionine are dietary essentials for man as well as for animals.

In a subsequent report, Rose *et al.*,[24] showed in the same manner that threonine, leucine, isoleucine, and phenylalanine are essential in the human diet. A most unexpected result was found with histidine. Removal of this amino acid from the diet had no effect on nitrogen equilibrium. Careful rechecking of the diets confirmed this fact. The conclusion reached, therefore, was that histidine, although essential for animals, is not necessary for the maintenance of nitrogen equilibrium in man. Latest reports from Rose's laboratory[25] bring the total of essential amino acids for man to eight, adding tryptophane and lysine to the previous list. Some doubt exists as to the probable significance of arginine, although as Holt and coworkers have suggested, this may have a function in normal spermatogenesis.

Further experiments are now under way in Rose's laboratory to determine minimum

daily requirements of the eight amino acids for the average male adult. Final determination of the exact quantitative and qualitative amino acid requirements of human beings will be practical value in calculating protein requirements more accurately, and in evaluating more precisely the biological significance of specific protein foods. Knowledge of exact amino acid requirements will also be of considerable importance in problems associated with the use of amino acid mixtures in parenteral alimentation and in shock therapy.

DIETARY VALUE OF PROTEINS

The establishment of 8 amino acids as dietary essentials for man and of 10 amino acids as essentials for certain test animals is of special practical significance in the nutritional evaluation of a protein. Because of the wide variation in amino acid make-up of individual proteins, it is necessary to consider not only the quantitative, but the qualitative nature of the proteins in the diet. Recent improved methods for the determination of amino acids in foods have contributed greatly to the classification of proteins on this important basis. The so-called complete protein is one which provides all of the essential amino acids in adequate amounts. Common foods sources providing high-quality, complete proteins are meat, fish, eggs, milk, cheese, ice cream, soybeans, etc.

It is interesting to note that if equal amounts (100 Gm.) of protein, supplied by meat and milk are compared, it is found that milk meets the optimal daily requirement for all the essential amino acids by more than 100 per cent, while meat meets the tyrosine and valine requirements by less than 100 per cent.[26] This is an important factor in considering the economic aspects of diets. Combinations of two or more of the incomplete, cheaper protein foods—those not containing all or sufficient amounts of the essential amino acids—is another way to provide adequate protein nutrition economically if the proteins are selected so that the amino acid deficiencies of one are supplemented by the amino acids provided by the other.

Future research in amino acid and protein nutrition undoubtedly will deal largely with the problems of which amino acids are required in the diet, the minimal requirements of each of these and the specific functions, in addition to the maintenance of nitrogen balance, which they may have. As these problems become more clearly defined, procedures for the quantitative determination of the amino acids in typical proteins will assume increasing importance as a means of evaluating the nutritive values of individual proteins and protein combinations in the diet.

*The National Research Council recommends a daily protein intake of 70 Gm. for the average 70 kg. man.

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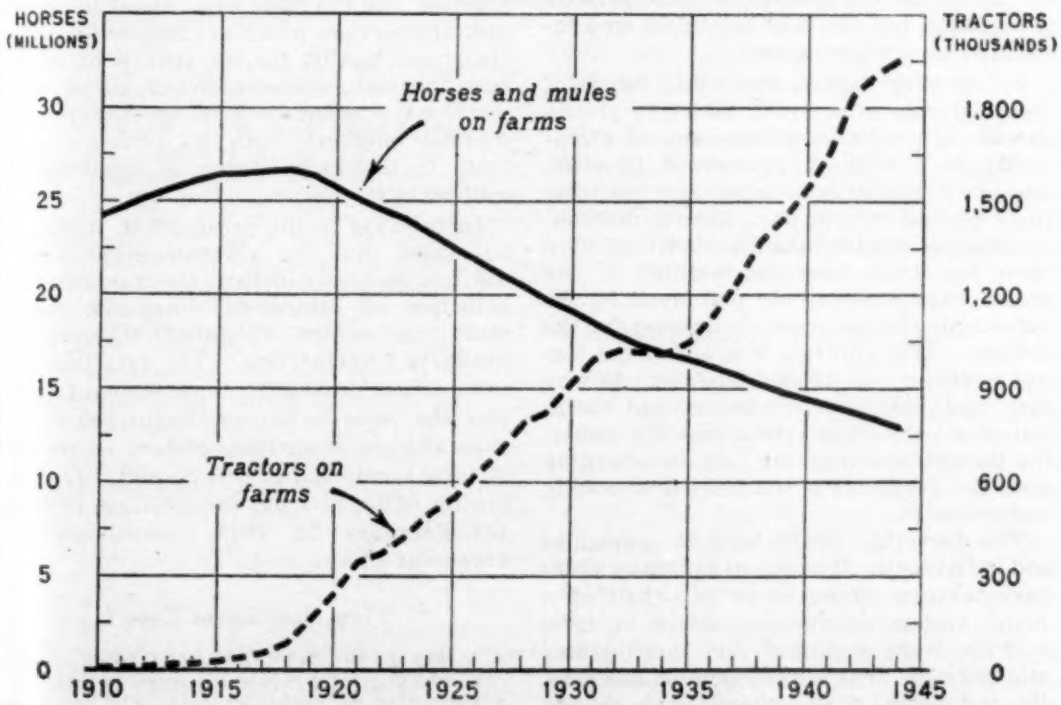
Our First Veterinary College

To keep American veterinary history straight, reports to the effect that veterinary education was started in Philadelphia in 1853 and Boston in 1854 should be deleted. Beings that die aborning were not actually born. Better to set the date at 1875 in New York City, when the first viable veterinary school was founded. The name was the American Veterinary College and the founder was Alexandre Liautard. Presumably reliable historians, here and abroad, agree.

HORSES AND MULES, AND TRACTORS ON FARMS JANUARY 1, UNITED STATES, 1910-44



—Bureau of Agricultural Economics.

Horses and mules, including colts, reached peak numbers in 1918, and have declined steadily since. Breeding slowed down after 1916. Colts are now insufficient to maintain the numbers of horses and mules of working age. Tractors had become basic equipment on many farms by 1930, and were added rapidly thereafter as farmers were able to buy a tractor and machines designed for effective use with it.

EDITORIAL

A Challenge and a Verdict

The recent trial before a federal grand jury of the government's anti-trust suit against a group of manufacturers of "animal medicines and supplies," who choose to sell their products only to qualified veterinarians, was an important event in American veterinary history. In a strictly legal sense, the issue concerned only an alleged conspiracy in violation of the Sherman Act. In a truer and broader sense, the whole principle of competent animal disease control was challenged and, by virtue of that fact, the entire veterinary profession was on trial. On this point, there is agreement among all who look beneath the surface of the action for the motives of those persons and groups, not officially identified, who instigated the strange attack.

By its very nature, the whole fabric of the trial was interwoven with the strong threads of veterinary science and its essentiality to a healthy, prosperous livestock economy. The story of veterinary medicine could be told only in part, but its inherent soundness, wholesomeness, and influence upon the daily lives and welfare of our people were convincingly portrayed by the defendants and the expert witnesses for the defense. When to this was added the logical testimony of the defendants as to why they had individually adopted and maintained a sales-to-veterinarians-only policy, the prompt action of the jury in returning a verdict favorable to the defense is readily understood.*

The fact that the defendant companies and individuals, all of whom for many years have taken a strong stand in behalf of a sound system of disease control in farm animals, were acquitted very quickly may minimize the true significance of the case. By and large, these ethical business and professional men are disposed to "let bygones be bygones" and to get back to the vastly more important work of producing for and serving the best interests of livestock growers and the country's needs for foods of animal origin.

If the outcome had been different, there is little doubt that certain elements would have interpreted it as a negation of the need for an orderly veterinary service and would have heralded it as a license to exploit further the diseases of farm animals. Moreover, in the popular mind, a verdict adverse to the defendants would have reflected against all our veterinary institutions alike—accredited educational and research facilities, the field of qualified practice, and the state and federal livestock sanitary services which are responsible, officially and legally, for the control of infectious animal diseases. What all of this would have meant in terms of encouraging medical quackery with its ultimate dire costs to livestock owners is appalling to contemplate.

In fairness to the prosecution, it should be stated that the government attorneys did not seriously debate the fundamental principle of competent diagnosis, treatment, and control of animal diseases by graduate veterinarians. The fact that the prosecution, during the trial, elected to narrow the issue to the production, distribution, and use of anti-hog-cholera serum and virus is significant in this respect. The following editorial from the *Chicago Tribune* for February 24, 1945, summarizes one viewpoint of the case.

The Hog Serum Case

A jury in the federal District court at Chicago recently set a record for speed in returning a verdict in an anti-trust case. The jury was back in court with its report 20 minutes after the judge had finished his instructions. The verdict was not guilty.

The concerns accused of conspiracy in restraint of trade were manufacturers and distributors of preparations for the prevention of

*Beginning in this issue, the JOURNAL is publishing a summary of the trial proceedings. The first installment will be found in "The News" section.

hog cholera. These products are marketed in two ways: One group of companies sells directly to the farmers or to dealers who sell directly to farmers. The other group of companies distributes their products exclusively thru veterinarians who are graduates of approved veterinary colleges, and wholesalers selling only to veterinarians.

The government's case was against the second group, the ones which sold only thru the animal doctors. About 12 years ago these concerns formed an association. The main purpose was to draw a code of fair business practice to be approved by the NRA. Another object was to engage in coöperative advertising to persuade farmers to employ veterinarians to immunize their swine and to persuade veterinarians to buy their supplies from the members of the association.

The government in 1942 obtained an indictment against the association, 15 members of it, and 21 individuals, charging that the association constituted a conspiracy in restraint of trade. The public had been adversely affected, the department of justice charged, because swine raisers were kept from administering personally to the ailments of their own animals.

The defendants admitted forming the association, but proved that they had been marketing their products exclusively thru the veterinarians for as long as 30 years. In getting together they had not changed their methods of doing business.

These manufacturers of products for the control and eradication of animal diseases had a right to market their goods any way they wanted to. The government acknowledged this. They also were within their admitted rights in forming an association and in advertising as an industry. The government did not question that the companies had sold their products thru veterinarians for years before the association was formed. But the government sought to find a conspiracy in the fact that the companies continued to decline to sell directly to the animal owners after the association was formed. It charged an agreement to that effect, but could not prove it.

The defendants, who were producers of a commodity essential to a large supply of food in war time, were under the cloud of an indictment for nearly three years. Their main interest had to be to obtain exoneration from the charge of having committed a crime. They were put to the expense of preparing a defense for a trial that lasted two weeks. They were cleared by the jury without hesitation.

No one knows how many more such cases there are going to be. With more than 500 employees in the anti-trust division, it can strike anywhere it chooses at any time. The division, under the present chief and his predecessor, Thurman Arnold, has as its aim the promotion of what it calls free enterprise. It does this partly by indictments and partly by speech-making campaigns. It's time that congress cut this business down to proper size and compel the trustbusters to confine their attacks to the real trusts.

The veterinary profession should ever be grateful that a jury saw so clearly the reasonableness of the individual defendant's policies. The verdict will be far-reaching in the future advancement of formal veterinary education, clinical veterinary medicine, and official disease control services. The American farmer, the accredited segments of the veterinary service, and the other firms pursuing the same policy as the defendants, ought to congratulate themselves for the strong stand taken by the companies and individuals in the face of the enormous personal cost of their defense.

At the same time, there is a very clear responsibility upon every individual in the veterinary profession and upon every segment of the veterinary service. Satisfaction over the outcome must be counterbalanced by a determination to work even harder to maintain the respect for the principles of veterinary medicine patent in the conclusive answer given in this case. Nor should the outcome delude anyone into believing that it will spell the end of animal disease exploitation by those who short-cut scientific methods of disease control, and who ignore the pattern by which success in this field has been achieved by accredited veterinary agencies in the past sixty years. Accepting the verdict as a heartening moral victory is not enough; only by sticking to, and fighting for, the fundamental issues involved can the veterinary profession discharge its responsibilities to the people and the industry it serves.

Backwardness in Organizing

The veterinary profession has been backward in building up its societies to an insuperable maximum, but frankly, the cause is not simple. Personal indifference explains exactly nothing. Few men are that stupid. The reason is too remote to clear up with a mere flight of rhetoric. Two centuries ago, veterinary medicine was founded to promote the *health*, the *production*, and the *use* of domestic animals. A world that had lost its bearing in the medieval wilderness was on its way out when veterinary knowledge began to take form. But, the profession created thereby sacrificed most of its heritage early by miscalculating that its main, if not sole, purpose was "doctoring" the sick. The important ramifications into the field of na-

tional economics went to a scattered nonveterinary personnel to direct and develop, while the profession originally conceived was demoted (virtually buried) to a place of secondary rating. That is to say, veterinary medicine became but the foundation of the colossal superstructure erected to watch over man's subsistence, notwithstanding that it had significant work to do in practically all parts of the structure.

The poignant theme is that duties beyond the mere treatment of the sick were not collected into an understandable whole, with the object of making the scope of veterinary medicine a definable entity. There is still no answer to "What is veterinary service?", complete as the answer has to be to win wholehearted admission into the family of the social sciences. On the way to that end lies the veterinary educational system, the only present segment of college education capable of qualifying men to guard the *health*, the *production*, and the *use* of animals, as the founding fathers intended it should.

What has this to do with backwardness in organizing? Quite a great deal. Before joining anything, one must first know what he's joining and why. When the AVMA set out to survey the "Land of Veterinary Medicine" and to cultivate its resources, the membership multiplied.

James Law, 1838-1921

Eighteen sixty-eight is a time-mark of American veterinary history. In that year, Professor James Law (Edinburgh '53, M.R.C.V.S. '63, F.R.C.V.S. '70) came to the United States to fill the chair of veterinary science at Cornell University, and twenty-six years later he founded the New York State Veterinary College of that institution. Indisputably, the arrival of Professor Law in the United States marks the year when formal knowledge of veterinary medicine took the form of an effective weapon against the diseases of farm animals, which, at that hour were a grave hindrance to postwar reconstruction—the hindrance that, obviously, sent President Andrew D. White of Cornell abroad, in 1868, in search of nonresident talent to build up a course in veterinary science, and other studies. This *memoria* is occasioned by a biographical sketch in the *Cornell Alumni News* (Jan. 15, 1945) by Dr. R. R. Birch, who, in "Cornell's Educational Pioneers" section, commemorates the arrival of Dr. Law in America, his remarkable popularity as a teacher, the yeoman service he rendered in the control of animal plagues, his authorship of important works on veterinary medicine, and his leadership in the field of higher veterinary education, all of which should remind the present generation of the debt owed to the high ideals and achievements of the 30-year-old Scotch veterinarian, who came to Cornell in 1868.

Dr. James Law

Founder and first dean of the New York State Veterinary College, Cornell University. Prominent figure in the early campaigns against diseases of farm animals.

The Fate of Anonymous Communications

Occasional unsigned contributions are addressed to the JOURNAL or to the Association. Some of these contain constructive criticisms of published material or interesting comments on professional problems which merit use, or at least a reply. Such anonymous communications, however, can only be filed—in the waste basket.

Thomas Paine, immortal figure of American, British, and French political life, wrote in his *"Crisis Papers"* on the American Revolution: "Would you rather have peace in your time and death and destruction of your children; or, would you rather face the issue and settle it now?" Moral: Keep buying War Bonds.

The anticipated drop in the production of fats and oils is based, to a considerable extent, upon the 25 per cent decrease in the number of 1945 hogs.

CURRENT LITERATURE

ABSTRACTS

Biophysical Problems of Viruses

There are three biophysical problems of viruses to be dealt with: (1) their concentration, purification, and physicochemical properties; (2) the specific antisubstances, *i.e.*, the animal's response to the infection; and (3) the antibody interaction that purification makes possible. The answers to this threefold approach will point out ways of recognizing viruses and aid in handling virus diseases with antiserums and preventive vaccines. Through colloidal chemistry, the size of virus particles can be studied down to the lower limit of microscopic vision. But what is particularly desirable to know about viruses is how to obtain them pure and in sufficient quantity for the study of their basic properties, their nature, chemical composition, sizes, shapes, electrical characteristics of their elementary particles, their absorption spectra, changes brought about by radiation, mild chemicals, and their relation to other molecular substances in living cells. The small quantity of virus contained in infected tissues and their chemical instability make the purification of viruses difficult. Amounts range from 1 part per thousand to 1 part per million, thus few viruses can be obtained even in milligram quantites (from infected material), although the quantity of purified virus needed to infect varies greatly. The virus itself and the route of invasion are factors in absolute infectiousness, which may be no more than *ca* 10^{-14} Gm. to produce disease, though in the case of some viruses, the average infective dose may be many million times more.

Chemical and physical methods of purification are described, and the value of ultracentrifugation and electron microscopy estimated. Summed up, there is no sure way to establish the purity of a refined virus preparation, and though viruses are easy to recognize by the diseases they produce, there are substances of similar particle size that complicate the purification of them, even rendering that impossible. Moreover, there are viruses of the same size to be differentiated from the components of the healthy tissues involved. Quoting: "Evidently much more work will be required before there is a real understanding of these 'normal' substances," and as for purified antibodies, these would enhance the sensitivity of virus detection.—[*Dr. Ralph W. G. Wyckoff, School of Public Health, University of Michigan: Some Biophysical Problems of Viruses, Science, 101, (Feb. 9, 1945): 129-136.*]

Atypical Pneumonia (Human)

A primary, atypical bronchopneumonia, outnumbering pneumococcus pneumonia 4 to 1, has been prevalent in the United States for the past two years. The true incidence is not known. The etiologic agent is a virus closely related to that of psittacosis and lymphogranuloma venereum. The onset is sudden with unproductive cough, dryness of the throat and nose, headache, dizziness, and general malaise. The temperature runs from 102 to 104 F., and the pulse rate is low compared with the fever. The patients do not consider themselves severely ill, unless the course is prolonged. The disease may be confused with tuberculosis. It spreads from patient to patient. Incubation period eighteen days.—[*P. S. Rhodes: The Probable Incidence and Clinical Features of "Virus" Pneumonia. Radiology, 40, (Apr., 1943): 327, through Am. Rev. Tuberc., 50, (Nov., 1944): 56.*]

Wheat Feeding

Objections to the feeding of wheat to livestock stem from lack of care in restricting the quantity fed and in making the change from other grains suddenly. When the substitution is made carefully and gradually, wheat is a safe feed. For cattle and horses, wheat should be coarsely ground—like the "first crack" of the flour mills. For sheep, because they masticate grain more carefully, wheat may be fed whole. Shifting from one grain to another in any event should always be done gradually. Failing in this respect is a common cause of trouble in livestock feeding. In high-producing dairy cows, mixing 1 lb. of chaff to 4 lb. of wheat prevents the forming of glutenous masses. In this way, cattle can be fed 8 lb. of wheat per day and sheep 1 lb., safely.

Moreover, since wheat, like other cereals, is extremely deficient in calcium, it is essential to feed a reliable calcic supplement at the rate of 1 lb. to 100 lb. of total concentrate, and when the feeding of wheat is anticipated to overcome a shortage of other grains, its use should

not be delayed until clinical deficiency is apparent. For example, in cows, when milk production has declined to a low level or in ewes losing condition during the last month of gestation, the sudden shifting to wheat would be disappointing, as much as it would have been helpful had the substitution been done earlier. —[*P. G. Schinckel, B.V.Sc., R.D.A.: Wheat Feeding and Drought Management. J. Agric., South Australia, November, 1944.*]

Closing the Race Tracks

Whatever may be said for and against the closing of race tracks for the duration of the war, the plea of the fair-minded is for letting the people understand the issue, and its ultimate effect. The tracks have bowed to the will of the government without a murmur and all they ask for the sacrifice is a four-square adjudication by the people in lieu of the snap judgment based upon garbled statistics and misinformation about the horse-racing fraternity that has been passed out and magnified for popular consumption in newspapers and magazines. The charge that racing used potential manpower and transportation, caused absenteeism from war plants, and mitigated the sale of war bonds may have an element of truth but these have been exaggerated far beyond any contention of the government and none is supported by accurate statistics. In fact; were this misrepresentation to continue for long, there is some question whether racing would survive at all, for there are states in which it was accepted as an established enterprise that may henceforth question its worthiness. The cause may be attributed to letting down production on the false rumors to the effect that the war was about over and the sudden realization that all-out production must be resumed. There was no assumption that racing was guilty of something.—[*Editorial: Let the People Understand. The Blood Horse, 43, (Jan. 13, 1945): 63-64.*]

BOOKS AND REPORTS

Bovine Trichomoniasis

For him who would keep his ken in order, the most useful books in this hour of veterinary development are the lively, informative monographs. If their make up connotes coherent construction, well-prepared tabulations, careful composition, complete coverage, and utilitarian bibliographies, they augment the sum of knowledge actually required to feel abreast of the times, more particularly so when based upon painstaking research and brow-knitting observation. Such are the meditations evolved by reading *Bovine Trichomoniasis*, a monograph built of competent research conducted under the favorable surroundings provided by an important dairy-cattle population. Obviously, Wisconsin's bent to master its dairy-farm problems was a factor in the birth of this book.

This venereal disease of the cow and bull is truly a veterinary paradox, for, as a known protozoan infection, bovine trichomoniasis is still in the early teen age, born *per se* in the United States in 1932 when Emmerson, School of Veterinary Medicine, University of Pennsylvania, captured the species of Trichomonas that has zoomed in veterinary literature by leaps and bounds in the last ten years, mostly in the last six years, noting that among the 408 references cited, the preponderance of them are dated since 1938—most of them since 1940. Here is one of those "diseases of the future" of which the lamented Dean Moore of Cornell used to speak, in that this genital infection not only became a "disease of the present" with unusual rapidity but came in with the velocity of a typhoon after having been bypassed unseen through all of the years of microbiology. So, "diseases of the future" is a phrase to venerate, not to forget. The depth of its meaning was never better illustrated than by the sudden discovery of *Trichomonas foetus* and its pathogenicity in dairy cows, which, in the manner of speaking, came upon the practice of veterinary medicine hailing its importance in animal production, its inhibitions on the regularity of bovine reproduction, its worldwide omnipresence, and, as the author indicates, its not-so-easy diagnosis if not suspected.

The material is arranged into (1) a foreword by Dr. W. L. Boyd, University of Minnesota, (2) the author's preface and acknowledgments, (3) 12 chapters of text, (4) a host list depicting the widespread presence of Trichomonas in animal life, (5) a closing hint on the use of diagnostic equipment in the field and laboratory.

This 150-page monograph is a publication to be honored as the *denier mot* on a truly important disease of the dairy farm. Details in technical imperfections, if any, must be left to experts in the fields of application and research. There is unfinished work and controversy to iron out, judging from the deluge of literature available. So, pick ups from the text for criticism or panegyric would be purposeless solecism, all facts considered.

On the whole, the book shows profound respect for good usage, but what to do with "trichomonads" as the plural of the proper noun "Trichomonas" may bewilder the more critical reviewers, though, regretfully, it conforms to the growing habit of concocting convenient plurals of that type in veterinary literature at this hour.—[*Banner Bill Morgan, Parasitologist and Assistant Professor of Veterinary Science, University of Wisconsin: Bovine Trichomoniasis. 150 pages. Offset printing. Board. Inserted illustrations. Burgess Publishing Company, Minneapolis. Price $3.50.*]

THE NEWS

1945 Annual Session Cancelled

Following recommendations made by the Board of Governors, the Executive Board has voted unanimously to cancel the annual meeting which had been scheduled for Aug. 21-24, 1945, in Chicago. This action was taken in support of the government's request that all organizations abandon convention plans, involving more than 50 persons, in order to relieve the strain on overburdened transportation and hotel facilities.

In lieu of the annual meeting, there will be business sessions only of the Board of Governors, Executive Board, and House of Representatives, in Chicago, which will not involve more than 50 out-of-town persons requiring travel and hotel accommodations. These sessions will probably be held sometime during the week originally scheduled for the AVMA meeting and will be announced later.

The meetings of the Boards and House of Representatives will enable the Association to transact all necessary business with the exception of electing and installing new officers. Since the latter are regularly nominated, and usually elected, at the first general session of the membership convened during an annual meeting; since no other method would be in accord with the Constitution and Administrative By-Laws; and in view of the small portion of the membership which will be represented at the business sessions, it has been determined that the present officers should hold over for the Association year of 1945-46.

Board of Governors Session

Drs. W. A. Hagan, James Farquharson, and B. T. Simms were in Chicago on Feb. 23 and 24 for sessions of the Board of Governors. Among other association business transacted, it was voted to recommend to the Executive Board that the 1945 annual meeting be cancelled in view of the government's "voluntary" ban on conventions.

Dr. R. C. Klussendorf, who will come with the Association as associate editor and assistant executive secretary, effective April 1, 1945, was named to represent the AVMA on the Inter-Association Council on Animal Disease and Production vice the late Dr. O. V. Brumley.

Dr. H. L. Foust, chairman of the Special Committee on Postwar Planning, and Dr. J. L. Barger, a member of the Committee, met with the Board on Feb. 24 to discuss several phases of the Committee's activities.

Women's Auxiliary Preparing Educational Material

The Women's Auxiliary to the AVMA has in preparation educational material regarding the veterinary profession, which they hope will be of interest to wives of veterinarians and to their husbands. The Auxiliary is endeavoring to enlist the wife of some veterinarian in each state to serve as state representative for the organization and to aid in the distribution of the educational leaflets.

Mrs. H. Preston Hoskins, president of the

Mrs. H. Preston Hoskins

Auxiliary, and Mrs. C. L. Miller, secretary-treasurer, bespeak the interest and coöperation of everyone connected with the profession.

Nominations for Awards Invited

President James Farquharson, chairman *ex officio* of the Committee on Twelfth International Veterinary Congress Prize and of the AVMA Committee on Awards, invites nominations from the membership for the 1945 awards which are administered by the Association. The following brief description of the awards gives the considerations on which nominations should be based.

Twelfth International Veterinary Congress Prize

The Twelfth International Veterinary Congress Prize is awarded to a member of the Association for distinguished services to veterinary science and the livestock industry. The award is a scroll and a cash prize representing the annual interest (now $125) on a special fund, which is invested in U. S. Treasury bonds purchased from the residue of money collected for the Twelfth International Veterinary Congress held in New York in 1934.

The award was first given in 1937, the recipient being Dr. Denny A. Udall. Since then the recipients have been:

1938—Dr. George H. Hart
1939—Dr. John R. Mohler
1940—Dr. I. Forest Huddleson
1941—Dr. Adolph Eichhorn
1942—Brig. Gen. Raymond A. Kelser
1943—Dr. Otto Stader
1944—Dr. David F. Luckey

The committee for this award is an *ex officio* one and includes, in addition to President Farquharson as chairman, the following: Dr. W. A. Hagan, chairman, Executive Board; Dr. B. T. Simms, president-elect; Brig. Gen. R. A. Kelser, director, Veterinary Division, Surgeon General's Office, and Dr. A. W. Miller, chief, Bureau of Animal Industry.

Nominations for this award should be filed with Dr. James Farquharson, Division of Veterinary Medicine, Colorado A. & M. College, Ft. Collins, on or before June 1, 1945, and must be accompanied by a brief setting forth the accomplishments of the person nominated.

Borden Award

The Borden Award is for "outstanding research contributing to dairy cattle disease control." It consists of a gold medal and a cash prize of $1,000.

This award was first made available in the field of veterinary science in 1944 by the Borden Company, which established several awards in 1936 to give appropriate recognition to those who have made outstanding contributions to, and to stimulate further research in, food industry in such fields as food chemistry, biochemistry, human nutrition, animal physiology and genetics, agricultural production, animal feeding, and related fields. Other Borden awards are now administered by the American Chemical Society, American Dairy Science Association, American Home Economics Association, Poultry Science Association, American Institute of Nutrition, and American Academy of Pediatrics.

The award administered by the AVMA, as with other Borden awards, is made for research which has been reported in public documents or scientific journals. The work need not have been done during the year immediately preceding, but must be based on outstanding research in the control of dairy-cattle disease reported in scientific literature.

The recipient of this award in 1944 was Dr. I. Forest Huddleson.

The AVMA Committee which administers the Borden Award is also an *ex officio* body and comprises President James Farquharson, chairman; Dr. M. Barker, Veterinary Director General of Canada; Dr. H. H. Dukes, AVMA representative to the National Research Council (Division of Biology and Agriculture); Dr. W. H. Feldman, AVMA representative to the National Research Council (Division of Medical Sciences); Dr. W. A. Hagan, chairman, Executive Board, and Dr. A. W. Miller, chief, Bureau of Animal Industry.

Nominations for the Borden Award should be filed with Dr. Farquharson not later than June 1, 1945, and must be accompanied by a suitable brief setting forth the research in dairy cattle disease control of the person nominated, together with literature citations.

Humane Act Award

Dr. Wesley A. Young, chairman, invites nominations for the Humane Act Award first presented by the AVMA in 1944. The award is a scroll and is for outstanding work in behalf of kindness to animals by a boy or girl not more than 18 years of age. The basis for the award is, primarily, accomplishment in the field of humane care or treatment of animals in general and not so much for rescuing an animal in danger.

This award was given to Frank Kiemele of Chicago in 1944.

The other members of this committee are Dr. S. T. Michael, of San Francisco, and Dr. E. F. Schroeder, of Boston.

Nominations may be made by individuals or organizations and should be sent to the chairman, Dr. Wesley A. Young, 157 W. Grand Ave., Chicago, or to the AVMA office not later than April 30, 1945. Each nomination must be accompanied by supporting evidence. The committee will carefully review all nominations for the 1945 award and make further investigations of the kindness-to-animals work of the nominees whenever this is desirable.

Summary of the Suit Against Associated Serum Producers

Acquittal of the defendants in the anti-trust suit, United States of America vs. Associated Serum Producers, Inc., *et al.*, was announced in the March JOURNAL (p. 179). The case was tried in the U. S. District Court for the Northern District of Illinois, Eastern Division, beginning on Feb. 5, 1945, and concluding on Feb. 16, 1945. Because of the widespread interest in, and significance of, the case, the JOURNAL will publish, beginning in this issue, a summary of the proceedings and a brief outline of events which preceded the trial. The record is so voluminous that the material presented will be largely a digest of it; the opening statements and closing arguments of counsel for prosecution and defense, which summarize the salient features of the case, will be given in full.

DEPARTMENT OF JUSTICE INVESTIGATION

As part of the investigation of the drug industry, which the U. S. Department of Justice had been making for over a year previously, the AVMA was served on Sept. 18, 1941, with a *subpena duces tecum*, calling for the production of certain documents and records before a federal Grand Jury in Chicago. Among other material, the subpena called for minutes of association meetings, reports of certain committees, volumes of the JOURNAL, and all correspondence of the Association and its officers and employees relating to the sale and distribution of veterinary medicines and supplies for the period from Jan. 1, 1935, to the date of the subpena. In due course, the material responsive to the subpena was collected and submitted.

At about the same time, similar subpenas were issued to a number, if not all, state veterinary associations and to many manufacturers and distributors of biological and pharmaceutical products, surgical instruments, and other equipment used in the prevention and treatment of animal diseases.

THE INDICTMENT

On May 18, 1942, the federal Grand Jury, before which the inquiry was conducted by representatives of the Department of Justice, returned an indictment charging the Associated Serum Producers, Inc., its member companies (see the March JOURNAL, p. 179) and 21 individuals with an alleged conspiracy to restrain trade in "animal medicines and supplies" in violation of the Act of Congress of July 2, 1890, commonly known as the Sherman Act.

The term "animal medicines" was defined in the indictment as meaning "all types of biological and pharmaceutical products used in the prevention and treatment of disease in hogs, cattle, poultry, horses, sheep or other domestic animals." The term "supplies" was defined as meaning "all types of instruments, equipment, and supplies used in the treatment of animals for disease, their immunization against disease, and their identification."

The indictment described the nature of commerce involved in the use of these animal medicines and supplies, with special reference to anti-hog-cholera serum and virus. It noted that the defendant producers were a group whose products were marketed only to veterinarians and that, with a few exceptions, other producers marketed their products principally to consumers, *i.e.*, the owners of livestock. Also, paragraph 22 of the indictment stated that: "It is contrary to the customs of the veterinary profession for its members to sell animal medicines and supplies to consumers. Generally, veterinarians refrain from selling animal medicines and supplies to consumers."

The indictment alleged an unreasonable restraint in the sale and distribution of animal medicines and supplies, because of the defendants' policies of selling their products "only to veterinarians who are graduates of approved veterinary colleges." It also alleged a conspiracy to establish, maintain, and enforce this restricted policy.

Finally, the indictment charged that the alleged conspiracy had the effect, among other things, of arbitrarily and unreasonably preventing swine raisers, stockmen, poultrymen, farmers, and other animal owners from immunizing their own animals: of arbitrarily and unreasonably excluding others from engaging in the sale and distribution of animal medicines and supplies, and of arbitrarily and unreasonably suppressing competition in them.

EVENTS BETWEEN INDICTMENT AND TRIAL

In the interval of more than two and a half years between the date of the indictment, May 28, 1942, and the trial, various legal procedures transpired, including the filing of briefs by the defendants demurring to the indictment and the government's response thereto. Subsequently, a defense motion to quash the indictment was argued before the court, the judge deciding that the case should go before a jury for trial.

The Trial

The case came to trial on Monday, Feb. 5, 1945, before Judge William H. Holly, of the federal District Court for the Northern District of Illinois, at the U. S. Court House, Chicago, Ill.

For the government, the attorneys were Mr. George B. Haddock, special assistant to the Attorney General, and Mr. Ewart Harris, special attorney.

For the defendants, the attorneys were Mr. M. W. Borders, of Borders, Reinhardt, Margolin and Wimmel, Kansas City, Mo.; Mr. George Tunison, of Tunison and Joyner, Omaha, Neb., and Mr. A. L. Hodson, of Kirkland, Fleming, Green, Martin and Ellis, Chicago, Ill.

After the usual preliminaries, an adjournment was taken until Tuesday, Feb. 6, to enable counsel to review certain exhibits to be submitted in evidence.

The jury was examined and accepted on the morning of Feb. 6, 1945, after which Mr. Harris made the following opening statement on behalf of the United States.

OPENING STATEMENT ON BEHALF OF THE UNITED STATES

MR. HARRIS—Counsel for the defense, ladies and gentlemen of the jury:

It is the privilege of counsel on both sides of the case at this time, at the beginning of the trial, to tell the jury something of what the case is about, to tell the jury what they expect to prove, what they expect the evidence will show. It gives us a sort of preview of what you may expect to come and gives you an idea of what everything is about so that you might fit in the various portions of evidence to our general statement.

Now, before I begin the few words that I will have to say to you on behalf of the Government, I want to read to you that part of Section 1 of the Sherman Act which is involved in this case. This is that portion of the Act which the Government charges the defendants have broken, of violating, and it is this—I am reading now, if the Court please, from Title 15, Chapter 1, Section 1:

"Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several states, or with foreign nations is hereby declared to be illegal.

"Every person who shall make any contract or engage in any combination or conspiracy declared by Sections 1 to 7 of this title to be illegal shall be guilty of a misdemeanor."

I want now to read to you a short portion of the charge against the defendants, that is, the charge that you have heard spoken about, that was contained in the indictment, so that you will know just exactly what we are talking about in this case.

I am going to skip various portions, which are not important at this time, and come to what we call the conspiracy.

Now, this indictment was returned May 28, 1942, and covers the three years prior to that, so that you will hear quite a bit in this case about the years 1939, 1940 and 1941, and the significance of that is the portion of the time which covers the three years before 1942, May 28th.

"During the period of approximately nine years immediately preceding the return of this indictment, defendants and others to the Grand Jurors unknown have knowingly and continuously engaged in a wrongful and unlawful combination and conspiracy to establish, maintain, and enforce an arbitrary, artificial and unreasonable policy and program of distribution restricting the channels of distribution through which animal medicines and supplies are sold and distributed in interstate commerce for distribution to consumers, which conspiracy has been in restraint of the heretofore described commerce in animal medicines and supplies among the several states and in violation of Section 1 of the Act of Congress of July 2, 1890, commonly known as the Sherman Act.

"The aforesaid conspiracy has consisted of a continuing agreement and concert of action among the defendants, the substantial terms of which have been—"

and we charge this:

"That each defendant producer sell animal medicines and supplies only to veterinarians who are graduates of approved veterinary colleges and to producers, wholesalers, and dealers who sell only to such veterinarians, and to purchasers for resale who likewise confine their sales."

And it was agreed, we say, among the defendants:

"That each defendant producer refrain from selling animal medicines and supplies to consumers and to producers, wholesalers, and dealers who either resell such medicines and supplies to consumers or permit those to whom they resell such medicines and supplies to sell to consumers."

And we say they agreed:

"That each defendant producer refrain from advertising its products direct to the farmer by the use of farm papers, the radio, by circularizing through the mail, or by other means."

And we say they agreed:

"That the defendant Associated Serum Producers, Inc. require its members to sell animal medicines and supplies only to veterinarians who are graduates of approved veterinary colleges and to producers, wholesalers, and dealers who sell only to such veterinarians, and to purchasers for resale who likewise confine their sales."

And we say they agree:

"That the defendant Associated Serum Producers, Inc. require its members to refrain from selling their products to consumers and to producers, wholesalers, and dealers who either resell such products to consumers or permit those to whom they resell such products to sell to consumers."

And we say they agreed:

"That the defendant Associated Serum Producers, Inc. require its members to refrain from advertising their products direct to the farmer by the use of farm papers, the radio, by circularizing through the mail, or by other means."

And we say:

"For the purpose of effectuating the aforesaid conspiracy, the defendants, by agreement and concerted action, have regularly and continuously done those things and performed those acts which they conspired to do as hereinbefore alleged."

The Government charges the effect of this conspiracy as follows:

"The conspiracy alleged in this indictment has had the effect, as intended by the defendants, of arbitrarily and unreasonably preventing swine raisers, stockmen, poultrymen, farmers, and other animal owners from administering immunizing agents to their own animals; of arbitrarily and unreasonably controlling, restricting, limiting, and restraining the channels through which animal medicines and supplies are distributed and sold; of arbitrarily and unreasonably restricting, limiting, and confining the individual liberty of trade of each of the defendant producers; of arbitrarily and unreasonably excluding persons, firms, corporations, and associations from engaging in the distribution and sale of said animal medicines and supplies; of arbitrarily and unreasonably suppressing competition among the defendant manufacturers and nondefendant wholesalers and dealers in the distribution and sale of animal medicines and supplies to consumers; and has had the effect thereby of restraining the hereinbefore described interstate trade and commerce in animal medicines and supplies."

That is the charge.

Now, we expect to prove the charge by this evidence. The Government will show, in the first place, the nature of the commerce, the interstate commerce that is involved.

We will have testimony from the witness stand, from which you will learn that the hog raising—and I might say that a great deal of this case, so far as we are concerned, will be taken up with hog-cholera virus and hog-cholera serum, for the reason among other things that among these particular defendants that was the principal line. Some of them, I think the evidence will show, did nothing else but produce virus and serum, although they might sell other medicines that they bought from those houses that did produce them.

Now, hog-cholera virus and serum will be known in this case as immunizing agents, the idea, of course, being that if you inoculate a hog or a pig, a young pig, with hog-cholera virus and serum you will immunize him against the attack of hog-cholera.

Now, you will learn from the testimony, as I say, that hog raising is one of the major industries of the United States, and it is in this part of the country that the principal hog raising is done. Those are the corn states. Illinois is one of the big hog-raising states; Iowa is the biggest of them all, and all through that central part of America, all around here, you will find, are the big hog-raising states.

It was, as the history will show, and as the witnesses will tell you,—and I might say to you that there will be a great deal of evidence put in in this case, probably on both sides, about which there will be no conflict. That is, there will be evidence that will come before you which will either be agreed to be the fact or will be denied to be the fact; there may be some other facts that will be controverted, but there will be a lot of agreement among us on quite a number of the facts in this case.

As I say, then you will learn that for many years after the settlement of this country, after the introduction—we don't know how it was, some of the witnesses may know—after the introduction into this country of hog cholera it became a scourge, a veritable scourge, a veritable plague. Hogs would die by the thousands. The losses ran

up into the millions and there seemed to be nothing particularly that could be done about it.

About 1910, I believe it was, I think there were two or three veterinarians who were employed by the Bureau of Animal Industry of the Department of Agriculture, and they discovered there was a way to prevent the deaths, that almost invariably would occur after a hog was attacked by cholera, by vaccination. It is not vaccination. There is a difference between those two things, but we will probably call it vaccination in a loose way. It is an inoculation. Young pigs, or even the older hogs, by injecting into their bodies, just under the foreleg—they call it the arm pit, I think—some virus, cholera virus.

In other words, to give the pig a dose of cholera. That is actually, you will learn that this virus was taken from the blood of what we call hyperimmune pigs, a pig full of cholera but who is able to throw it off. There is given to this pig at the same time in what is known as a simultaneous inoculation, a dose of serum that is usually given in the hind leg. Those two things go together, that is, the inoculation, and it has been found to be, as the evidence will show, extremely successful.

Since the general use of hog-cholera serum and virus, the losses of hogs from cholera has dropped tremendously. I do not think there will be any question about that. Yet even so, these plagues still come, and if, it will appear from the evidence, the hogs are not immunized, or if there is carelessness about it, there will be losses. If they are properly immunized the losses are likely to be very small.

Now, that was about 1910. About 1913, the evidence will show, the Government, through its Department of Agriculture, Bureau of Animal Industry, recognizing the extreme value of these inoculating agents, this virus and serum, and recognizing that the hog industry required that this stuff should be pure and should be what they call potent, there should be no dilution of it, early took over the regulation of the manufacture of virus and serum.

Standards were such, that is, the standards were such as to purity, as to potency, and before virus or serum is permitted to go into interstate commerce—and we are only concerned here with interstate commerce, although I think I can say without contradiction that it will be agreed here that all of the defendants are engaged in interstate commerce in the shipping of virus and serum to various states—the Government controlled the quality of the virus and serum and the various bottles are released after the Government inspectors, who are at these various plants, had passed on the virus and serum after certain tests.

Then it will appear from the evidence that this business of producing virus and serum—I am not going to describe it, I do not want to take time on the thing—became a big business. I think about the time the indictment was returned the business was grossing anywhere from five million dollars to seven million dollars a year in the sale of these things alone.

There were also, as I say, other animal medicines and supplies. You will hear about them. They will be described to you. I will not take the time, because as I say, you will find this virus and serum situation probably the most important one before you for your consideration.

There is perhaps some little question as to who did it first. I think there is perhaps a little rivalry as to who did it first, but somewhere around 1913 to 1916, one of the sellers, producers of hog-cholera virus and serum, adopted the policy of selling only to graduate veterinarians.

It may be that this defendant, it is a defendant, the corporation is a defendant, by the way, and this is along about 1913, as I say, it might be that this defendant restricted its sales only to licensed graduate veterinarians. It may be either graduate veterinarians or licensed graduate veterinarians, but the restriction was at least to graduate veterinarians, and of that the Government is not complaining in this case. When this house took that policy by itself, that was its privilege, undoubtedly, so far as the Sherman Act is concerned. We are not concerned with any other act but the Sherman Act, and it had a right, I assume, under the law, to choose its customers and it chose veterinarians.

Now after that another defendant and another house chose that policy, and one, two, three, four, you have probably ten, twelve or more, all choosing that policy, and it may be so far as we know and so far as you will ever know, it may be that they all decided individually by their own account, on their own accord, to limit their sales to graduate veterinarians only, and as I say, that is not the question we are concerned with in this case at the moment.

Now, the policy became known by various names. This sales policy, for a time, it may not be now, but there was a time when it was called the ethical policy, and a corporation or house that sold this virus and serum only to graduate veterinarians called itself an ethical house with an ethical policy.

There were other houses, other firms, that sold direct to the consumer, sold to the farmer, sold to anybody that had the money to buy it, and they became known as unethical or lay houses or direct-selling houses.

Now, so that we do not mix up our terms, and so that you do not get confused, or we do not get confused in this case, the Government will prefer to refer to these so-called ethical houses as either veterinary houses, which I believe they call themselves, or restricted sales companies, so that when you hear us speaking about a veterinary house or a restricted sales house you will know we are talking about the defendants, mostly. There are some one or two, I think, outside of this indictment, who follow that same policy.

When we talk about the houses, the firms that sell direct to the consumer, direct to the farmer, and the livestock owners, the Government will refer to them either as lay or direct-selling houses, and I think that term "lay", of course, is used instead of the profession of veterinarian. That is the only reason why that distinction is made, so when we talk about lay or direct-selling houses you will know we are talking about houses that sell direct to the consumer.

Now, that thing went on for quite a while, and it will appear in the evidence that these various houses from time to time would advertise to the world that they were selling only to veterinarians, that veterinarians should support them, that they were not selling to anybody else, so that anybody who had their virus and serum would have to have a veterinarian to administer it.

There came a time, however, as I say, they were doing this so far as we know independently, and of their own volition, but there came a time, however, and this is where the Government is interested, and this is where we are going to call your particular attention to the evidence, that in the year 1933, and that is where the nine years spoken of in the indictment comes in, although the three years is what we call the limitation period. In 1933, the evidence will show that a number of these restricted sales houses joined, and it is this joining that we say is unlawful. They joined together in the American Association of Serum Producers. That document, the document up there, of their joining this association, signed by many of them, will be in evidence, and I think one of the purposes,

one of the purposes of the American Association of Serum Producers was said to be to encourage and maintain uniform trade practices and the correct administration of serum and virus.

We expect to show in this case what was meant by the correct administration of serum and virus. We charge that that meant administration only by veterinarians.

Now, that Association, the evidence will show, ran along for just a few months and then they got together, practically all of the members of the Association got together, and formed a corporation.

The other was just articles of association, they were just bound together by this document, but now they formed a corporation, the Associated Serum Producers, Inc., and that is one of the defendants in this case, and all of these defendants are members of Associated Serum Producers, Inc., and you will find from the evidence that this agreement, this joining in membership, was confined only to those houses which would sell only to veterinarians, which would restrict their policy to sales only to veterinarians.

No other person, no other corporation, no other individual ever became a member of that organization, unless it was the policy of that person applying for membership to restrict his sales to veterinarians only.

Now, you will learn from the evidence that these members had meetings from time to time and they discussed that policy and they discussed membership as to whether they should let others in and so forth, and then just after their forming this corporation, and certainly during the years 1939, 1940 and 1941, which are the three crucial years, we will show you that the defendants embarked on a program of advertising throughout the United States in the newspapers, over the radio, circularizing and so forth. They all joined, their efforts are all together, they paid their money, they assessed themselves for this campaign. We will show you that the campaign cost in one year fifteen thousand dollars, and spread abroad throughout the country throughout the hog-raising areas that it was unsafe, and undesirable to have your hogs vaccinated by anyone other than a veterinarian.

Over and over again you will see those advertisements: "Consult your veterinarian." "Vaccination only by veterinarians, don't let anybody else do it."

The Government contends and expects to show in this case that that policy was directed to and intended to put the direct selling houses out of business; that it was their intention to take away from the direct-selling houses one large portion of their trade, the veterinary trade.

We will show to you that the veterinarians were told, "Do not patronize a direct-selling house. He is taking away your livelihood. Do not deal with them, deal with us, deal with us only."

And it is this thing that the Government contends is unlawful and expects to show in this case, beyond any reasonable doubt, that these things were done, and that was their effect, and we will show to you that that organization was in existence right up to the time of the indictment, May 28, 1942.

Among other things that will appear here, we will show that in these campaigns they adopted a name, they called themselves the American Foundation for Animal Health, and we will show the reason why they adopted that name American Foundation for Animal Health was so that persons who read the publicity and articles and advertisements put out by them should not know that it was the Associated Serum Producers, Inc. were the people that were putting them out, and that it would appear the facts about veterinarians, cholera, and everything else, that they were only interested in the health of the animal and not in selling serum.

We will show, the evidence will be here to show you, that these defendants circularized the veterinarians and said to the veterinarians, "We are the ones that will put up the money; here are our names, choose us when you want cholera virus and serum and choose only us."

The Government contends that that conduct restricted the channels of trade, restricted interstate commerce, took away from the farmer and from the livestock owner the opportunity to buy this serum wherever he needed it, when he needed it, and whether there was a veterinarian available or not.

Thank you.

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Following presentation of the government's statement, Mr. Tunison made the following opening statement on behalf of the defendants.

OPENING STATEMENT ON BEHALF OF THE DEFENDANTS

MR. TUNISON—May it please the Court, ladies and gentlemen of the jury: It is now the pleasure of counsel for these defendants to address you briefly, explain and outline for your information the facts constituting the defense of these men. Preliminary to that, let me say that you, as jurymen and jurywomen, will have in this case, a rather rare opportunity to envision a great field of animal health and animal medicine in these United States, so that I anticipate you will find that this isn't, perhaps, the customary dry, boresome recital of facts. It will be necessary in presenting the defense of these defendants to go into the field of animal health in these United States, into the field of the prevention and cure of animal diseases, both by our federal and state governments.

It will be necessary to go, to some extent, into the various animal diseases themselves, especially those which relate to, and have an effect on, the health of the human species, also to those which have an effect on the amount of food supply in this country.

Then it will be necessary to present to you the different kinds of animal remedies, those which are dangerous or poisonous, those which are dangerous to man and beast, the different kinds of animal disease, the different kinds of biologics, such as those which contain, and those which do not contain, living organisms. So, as I say, I think you are to be congratulated, in addition to your performing one of the great duties of citizenship, in passing upon the liberty of your fellow citizens.

Now, as counsel has outlined to you, these defendants are from numerous cities of the United States, numerous neighboring states, and I believe it would be interesting to you, because their names will be mentioned in various connections as we go along, if I would present them to you and identify them with their place of residence and the company with which they are connected.

(Mr. Tunison then introduced the defendants:

Mr. Carl N. Angst, Indianapolis, treasurer of Allied Laboratories, Inc.; Mr. Scott L. Barrett, Fort Dodge, Iowa, sales manager of Fort Dodge Laboratories, Inc.; Dr. Daniel E. Baughman, Fort Dodge, Iowa, president of Fort Dodge Laboratories, Inc.; Dr. Anthony E. Bott, East St. Louis, Ill., secretary-treasurer of Corn Belt Laboratories, Inc.; Dr. James T. Burris, Columbus, Ohio, president of the Columbus Serum Co.; Dr. Edward A. Cahill, Kansas City, Mo., president of Allied Laboratories, Inc.; Dr. Amor C. Drach, Omaha, Neb., vice-president of Corn States Serum Co.; Mr. Thomas R. Furry, Superior, Neb., president of the Blue Cross Serum Co.; Dr. Guy G. Graham, Kansas City, Mo., president of Jensen-Salsbery Laboratories, Inc.; Mr. Frank V. Hawkins, Indianapolis, assistant sec-

retary of Allied Laboratories, Inc.; Dr. Edward B. Hollecker, Kansas City, Kansas, president of the Missouri Valley Serum Co.; Dr. E. C. Jones, Lincoln, Neb., vice-president of Norden Laboratories; Dr. Ren C. Julien, Indianapolis, president of National Laboratories Corporation; Dr. Thomas W. Munce, Sioux City, Iowa, manager of the Sioux City Serum Co., division of Allied Laboratories, Inc.; Dr. Carl J. Norden, Lincoln, Neb., president of Norden Laboratories; Mr. Fred J. Rathman, Witchita, Kans., president of the Southwestern Serum Co.; Dr. Myron F. Wallace, Kansas City, Mo., secretary-treasurer of National Laboratories Corporation; Mr. Guy H. Williams, Omaha, Neb., president of Corn States Serum Co.; Mr. Robert M. Young, Omaha, Neb., president of the Grain Belt Supply Co., and Mr. Charles S. Greene, Whitehall, Ill., general manager of Gregory Laboratory, Inc.)

That completes the list of the defendants. You have already heard our associates, Mr. Mel Borders of Kansas City, and Mr. Les Hodson of your city of Chicago. My name is George Tunison, and I live in Omaha, so that we have all been properly introduced, ladies and gentlemen, and I will proceed with the next step of my statement.

As the counsel for the prosecution has advised you, this is a charge of unfair, unreasonable restraint of interstate commerce under the Sherman Act. Now, he outlined briefly to you the charges of the indictment, and read at considerable length from those printed pages, and I think we will admit that the mere reading of that was rather formidable.

I think it will be helpful to you in discussing the rather formidable charges of that printed indictment to refer briefly to one or two things that are not there. There is no charge, you will notice, of any price fixing in this case. There is no charge of allocation or division of territory between these different companies. There is no charge of allocation of customers in the veterinary profession among these different companies. The charge is that, while the prosecution admits and we are pleased to have them admit it, that each of these individual defendant companies had the perfect right to adopt their respective, individual, company policy of sales to or for veterinarians only, yet the charge is that they conspired—not to do any of these things I have mentioned, not to fix prices, not to allocate territory or customers—but that they did conspire among themselves that none of them would sell to anybody but veterinarians, so that in that respect I think you will at once see that this differs considerably from the ordinary, so-called antitrust case under the Sherman Act.

Now, in answer to the several pages read from that indictment, these defendants have just two words, and in your *voir dire* examination by Mr. Borders, he explained to you the importance of those two words. Those two words are, "Not guilty."

Counsel for the prosecution has outlined to you some of the facts and circumstances from which they expect you to draw the inference that there must have been some kind of an agreement between these men and these companies. Now, in defense to that evidence which the prosecution will present we expect to present to you facts and circumstances from which you will see why these men, why these individual defendants, and why these companies adopted the policy they did, what they believed when they adopted that policy, and what facts they had on which they adopted that belief, because, as I believe the Court will instruct you later in the case, the facts that a man knows, the experiences he has had which generate a belief in his mind, are important in determining the import of his action after he has acted.

The Court will explain to you, and, of course, you will be bound by his instructions, the effect and value and probative force of circumstantial evidence. In the earlier stages of this case, it was disclosed by the prosecution to the defendants that the prosecution expected to prove no express agreement. In other words, in some cases a group of defendants might be arraigned and come before you for trial, and there would be a written agreement that they had agreed to do certain things, and then the question for you to try, under the instructions of the Court, would be: Was that an unlawful agreement or was it not?

Now, in this case we are one step removed from that kind of a situation. In this case the evidence, as counsel has told you, will be purely circumstantial. In other words, a favorite expression is, this is what is called a "periphery" case. You all know what the periphery of a globe is. On this part of the periphery, here is one fact: over here is another one; over here is a third one, and over here is a fourth one, and the inference from the fact that these isolated facts are established is that there must have been a motivating active agreement or conspiracy inside of the periphery, of which these facts are manifestations.

Now, the Court will also tell you, I believe, that in considering circumstantial evidence of that kind you will have to be careful to see what inferences may be drawn from those facts, because this is a criminal case. These men are here charged with an offense against the laws of their country, and the Court, I believe, will tell you that in considering these facts, if you can draw any other reasonable inference from those facts except the inference of guilt, it is your duty to draw that other inference of innocence. That is a thing I know you will be careful to carry with you throughout this trial.

We all know that sometimes facts, sometimes circumstances point an unerring finger, but these men start into this case with the presumption that they are innocent, and that presumption will go with them through this trial, and as each one of these facts and circumstances comes up, you will in your own heart and your own mind be saying, "Now, what is the inference to be drawn from that fact? Is the inference equally compatible with innocence or with guilt?" And if it is compatible with innocence, it will be your duty to draw an inference of innocence.

Now, when all that has been done in this case, when the government, the prosecution, has put in these various scattered facts, when these defendants have met those facts with their reasons why they adopted this policy, then there will be one other thing, and that is one reason I was glad to have you folks meet these men at the outset. In addition to that, there will be the sworn testimony under oath of every one of those men who come before you today, that they did not engage in any conspiracy, that they did not make any agreement, that in forming this association for the purposes which I will presently come to, they were simply forwarding their own respective businesses in the same policy of distribution of their products which they had carried on, some of them for twenty and twenty-five years before that. So that we don't intend to present this case to you ladies and gentlemen on inferences. We intend to present it to you on facts of what these men had been doing for these years, and in addition to that, we will have the sworn testimony under oath of every one of these defendants that they never did make any such agreement, as against inferences which counsel will ask you to draw.

Now, counsel went briefly into the history of the development of animal medicines in this country. Well, we appreciate his reference to them, but we will have on the stand here, ladies and gentlemen, men who were there when these things were done.

He mentioned the development of anti-hog-cholera serum and virus over in your neighboring state of Iowa. The venerable Dr. Baughman who sits here, 78 years of age, as the historian once said, "All of which I saw and part of which I was," he was there when they were doing that. He will tell you about that in his own words, as a reason why he adopted as his policy, knowing those facts, the sale of animal medicines to veterinarians only.

We will also present to you men from the leading veterinary colleges in America, such as Cornell University, Iowa State College at Ames, men who will tell you what a veterinarian is, what the training of a veterinarian is, what his economic importance in the community is, how he handles these animal medicines and supplies, and the difference in the way in which he handles those medicines and supplies, and the way in which the layman handles those medicines and supplies.

Now, we don't intend to ask these men to get into controversial questions with you as to whether these animal medicines and supplies should be sold only to veterinarians or sold to farmers generally. We have never, and the evidence will so disclose, we have never in any way, shape, or form attempted to interfere with the sale of animal medicines and supplies by the so-called lay companies to whatever extent they see fit. What we have tried to do, on the other hand, is to show people by an educational program that the better way to handle these animal medicines and supplies is by trained men, just like when you have vital sickness in your own home, you call a doctor. You don't send to Montgomery-Ward for their catalog to see how to treat erysipelas in your child. That is the vital distinction here, and we accept the issue that counsel has tendered. He has told you about the developments of this industry briefly. He has admitted to you that our defendants individually have the right to have this individual sales policy, if that is what they individually see fit, but the thing he complains of is that we have conspired to put the lay companies out of business. You will recall that was the closing, final caption of the facts he presented to you.

Now, that is so far from the fact, ladies and gentlemen, that there won't be any doubt about that in this case when you get through. Why? Because we will present to you an official document of the United States, the order of the Secretary of Agriculture of the United States, regulating the handling of anti-hog-cholera serum and hog-cholera virus in the United States. That marketing agreement and order was adopted by these defendants and the lay companies, by all the companies in the business, pursuant to an act of Congress, because, as counsel has very truthfully told you, the maintenance of adequate supplies of anti-hog-cholera serum and virus to prevent these plagues of hog cholera is an important thing in preserving and protecting the food supply of these United States. So, Congress enacted an act in 1935 which will be presented to you, providing that this industry could enter into a marketing agreement and, thereupon, the Secretary of Agriculture would issue an order, B.A.I. Order 361, which regulates the marketing of serum and virus in these United States.

Now, counsel told you that the manufacture of those products for years, since the Virus and Toxin Act of 1913, had been regulated by the United States under the Bureau of Animal Industry, but from the time it left the door of the factory, the marketing had not been regulated. So this Marketing Agreement Act came along, and pursuant to that, the Marketing Agreement was executed and entered into and the order promulgated by the Secretary of Agriculture, and under that Act and that agreement and order, nobody in these United States can market anti-hog-cholera serum and virus in interstate commerce except pursuant to the terms of that agreement, and practically all the serum and virus in the United States is marketed in interstate commerce.

Now, the evidence will show you, ladies and gentlemen, that right in that agreement these two systems of marketing are recognized, and the control agency which administers this agreement, under the orders of the Secretary of Agriculture, is one group to represent manufacturers marketing—

MR. HARRIS—Will you pardon me, sir? I think, if the Court please, it is not proper at this time to read something that may not be in evidence.

THE COURT—Well, if there is any question of that being admitted in evidence, it should not be read, probably.

MR. TUNISON—Very well. I won't read from it, but the substance of it is—and if it is admitted in evidence the Court will explain that to you—that these two groups are recognized, one group marketing to veterinarians, and one group marketing to the lay companies. The president of that lay group and the present chairman of that control agency is Mr. John Swain of Chicago, president of the Fidelity Laboratories, who may be here as a witness. He is one of the six representatives of the lay companies. The representatives of the so-called veterinary companies sit before you as defendants in this case, and the evidence will show you that those two groups constituting that control agency, promulgated under the authority of a law of the United States, sit around the table just like we sit around this table here today, get along amicably, each goes their own way and all of them can market their serum and virus only pursuant to that marketing agreement. If any of them have any complaint about monopoly, unfair competition, unreasonable restraints of trade, that agreement provides a complete and adequate and administrative remedy, and in the years it has been in operation, since 1936, the two groups have gone along amicably, each pursuing their own field, and never one complaint of the matters that counsel complains about in this case.

So much for the statement that one of the purposes of this alleged conspiracy is to drive these lay companies out of business.

Now, we expect to show you by the evidence of these men, going back to 1912 and 1913, in the days when the animal medicine business was being developed, how these various men went into business. Most of them are scientifically trained men. Most of them are graduates of the best veterinary medical colleges of the day, and in one instance, a graduate also of a human medical college.

Now, each of these men, the evidence will show you, as they came along and went into business, decided which way they were going to go, so to speak. Should they embark on the field of sales to veterinarians only, or should they embark on the field of sales to the public generally? The evidence of these men will show you that in each case they made that decision for themselves. They made up their own minds, based on their scientific attainments, based on their experience in the field, based on the experience they had seen developed in the administration of animal medicines.

Now, they won't all tell you the same reasons. There were different reasons for that. With some, it was purely scientific. They had seen the administration of animal medicines by trained veterinarians, and they had seen the administration by stock raisers. They decided which way they wanted to go. In other instances, it was a matter of "How is the best way to get this business?" Because, fundamentally, what these men go into these businesses for is to create a business—and the history of how they have grown will be de-

veloped to you—and to make some money for themselves and their families and to pay their grocery bills.

Now, some, in addition to the scientific reasons, decided that they would rather cultivate the market, we will say, of 10,000 veterinarians in these United States than to cultivate a market of a million livestock owners in these United States. That is a perfectly reasonable ground, of course. One might say, "I can do more business by mail with my catalog and direct mail advertising and make more money." Another man might say, leaving out the scientific end of it, "I would prefer to do my business with salesmen who call on a smaller class. I don't want to have so much bookkeeping and so many accounts." Now, that is a perfectly good reason for a man to decide as to which way he wants to go.

There are others who made their decision,—counsel uses the word "ethical." Perhaps that is it; perhaps it is on humane grounds. Some of these men have a very distinct feeling that the humane, kindly way to administer medicines to animals is by people who are scientifically trained to do that. Now, of course, that kind of a reason won't appeal to counsel for the prosecution here, but it did appeal to some of these men.

Another reason that will be developed here is the consideration of protection of the good name of your product. Counsel has told you that the manufacture of these articles is regulated by law under the strict supervision of the Bureau of Animal Industry, but in many instances, when they leave the door of that factory, the control is off.

Now, many of these men, knowing the large amount of skill and technique that went into the preparation of those products, saw that when they reached the next step of their usefulness, while they were being transported to that point, perhaps needing refrigeration, then coming to be administered, that they wanted to know whether the man who was going to administer that product had made a proper diagnosis of the animal's illness, because many of these remedies, while useful and effective in a proper case, in another case would be either worthless, on the one hand, or perhaps fatal, on the other, so these men wanted to know that their product, after it left their door, had been properly refrigerated and transported to the place where it was going to be kept for use, and had been administered, after competent diagnosis, in a sanitary, clean, scientific manner, just the same as medicines are administered to a human being.

Now, the only way they could insure that was to see that those products were handled and administered by scientifically trained men. So that was another reason why some of these men did that.

Then the evidence will be presented to you, or at least it will be offered, that the United States of America has numerous laws, such as the Food and Drug Law, and you will be given a short course in that, probably, before we are through. The requirements of the Food and Drug Act of these United States for the transmission of merchandise in interstate commerce require an entirely different kind of labeling, an entirely different set of literature, in cases where the product is to be administered by a doctor or a veterinarian or a dentist from that which they require where the product is to be administered by the laity generally.

If one of these men wanted to try to carry on those two kinds of businesses, the evidence will show you that it would require an entirely different setup in his labeling and packaging department, which is another of the reasons which will be presented to you why a man should adopt the one policy or the other.

Then, many of these animal medicines, as experts, in addition to these defendants, will tell you, are virulent, disease-producing, living organisms, such as hog-cholera virus. Hog-cholera virus—counsel did not state it quite properly to you—but hog-cholera virus doesn't immunize anything. Hog-cholera virus is the refined, active, living organism from the blood of a hog that is fatally sick with hog-cholera, and this treatment, this so-called simultaneous treatment with serum and virus, which produces the immunization, is administered by putting a small amount of that living, virulent organism into the hog and at the same time a large dose of serum prepared from hogs which have been previously immunized, and that is what is called the simultaneous inoculation or treatment. In other words, this living virus sets up hog cholera in that animal. The serum, which is given at the same time, contains the counter-bodies and produces the immunization, but if you just put that virus into that hog he would be dead in a few days.

MR. HARRIS—I think I mentioned serum was also put in the ham and the virus in the arm pit. It is a simultaneous inoculation.

MR. TUNISON—I didn't mean to dispute you.

MR. HARRIS—That is all right, sir. I am not a veterinarian.

MR. TUNISON—Now, those are some of the reasons, and others will be developed to you as we go along.

The evidence, I believe, will be without dispute that each of these companies had this policy all these years.

Now, we will be entitled to one presumption at least, on our side, and that is the presumption of continuation. The presumption is that a man who is raised in the Methodist Church probably stays in the Methodist Church, and the man who is raised in the Catholic Church probably continues in the Catholic Church. The presumption would be, I believe, that these companies, having adopted these policies of sales to and for veterinarians only in their formative days and up to 1933, were just continuing that same policy. There is no reason why any of them should have made a change. So, the fact that they formed this association in 1933, we believe, should be considered in the light of the presumption that they would anyway, whether they had the association or not, have continued that same policy.

Then we come up to this critical year of 1933 that counsel has referred to, when the Associated Serum Producers was formed. Now, what were the reasons, which we will disclose to you, for the formation of that association?

In the first place, your common knowledge will tell you that associations are a normal thing. They are normal among human beings. They are normal among animals and birds. Now, when the birds out here on Lake Michigan start south, the greenhead mallards go in one flock and the mud hens go in another. It is just as natural for all kinds of living organisms to associate as it is to breathe.

Now, here is a group of men who had these common ideals, this common belief as to what was best. They formed this association for what? On the face of the papers which will be read to you, for only the highest ethical grounds, there is nothing in that that counsel can object to. It was to promote the welfare of animal food production and animal health in this country. To do that, they said this: "Each of these companies has been spending from a few hundred dollars to a few thousand dollars a year in advertising its products. If we would form an association and throw that money all in the hat and employ a first-class advertising man to get up interesting attractive copy, we could get much better results than we can by

this individual advertising at less money, and we can produce our serum and virus more economically, and in that way contribute to the good of the industry and our own good."

So they did that, and there won't be any question that they did those very things. They employed competent advertising help. They got up good readable copy. Did they advertise it direct to the farmer? Why, of course they advertised it direct to the farmer, just like they did previously, except that instead of a $100 ad in the *Kansas City Journal Stockman* or the *Illinois Farm Journal*, paid for by Guy Graham's company, telling everybody what good animal medicine Jensen-Salsbery made and how they might protect their animals, and a similar ad by Dr. Baughman's Fort Dodge Company, they said to the farmer, "We are getting an association together here, called the American Foundation for Animal Health", and that foundation is an association of these men, and when you have heard them on the witness stand you will say they are scientific experts. In other words, a committee was selected from these defendants to get out readable, instructive, helpful literature on animal diseases and the control of those animal diseases, and to publish that in these papers and recommend to people that when they are treating these animal diseases they employ scientifically trained veterinarians.

Now, that is the sum and substance of that alleged complaint, and in one of their meetings—and that will come out in the minutes of this association—in one of the meetings of this association there is an agreement; there is an agreement, and much will be made of that, whereby these defendants agreed that instead of doing this individual advertising which they had been doing, they would throw their money into the pot or into the hat and let it be expended for the general welfare.

Now, that is the only agreement, I submit,—that is the only agreement that the diligence of counsel will be able to present to you, and we submit that that was a perfectly logical, workable agreement for the benefit of all concerned.

Further, the evidence will show you, not one jot or tittle of an act or word or deed by any one of these defendants making any effort to drive the lay companies out of business, as counsel stated to you, was our purpose.

There were many other reasons besides this advertising campaign for this association. In the first place, this marketing agreement recognized that the policies of the so-called veterinary companies was different from that of the lay companies. They had their problems in the way of regulations by the Bureau of Animal Industry at Washington, and appointed committees. In other words, if some new or vague or perhaps unworkable regulation was promulgated by the BAI at Washington, a committee from this organization would be appointed to go down there and take that up with Dr. Mohler, or whoever was the head of the BAI, and try to work it out. A committee of two or three men made the trip and got the information and did the work for the benefit of the organization for much less expense and less waste of time and effort than if everybody had had to go.

Now, that made a small cost to each company. Of course, these men were interested in this advertising campaign, in the promotion of the sales of their serum and virus, and in the sale of the serum and virus of all of them. I take it that is nothing the Government should complain of, that they were making a sincere effort to sell more of their products by inducing more people to believe that their method of administration was the proper way.

The record will show, I think, that they have in large measure accomplished many of those good results, and I just want to refer in passing—it will be in evidence—to the very first advertising this association put out. It stated that it was "an organization whose object was to protect the serum industry and safeguard hog raising through the proper administration of serum and virus," and that has been the keynote of the advertising ever since.

This association did not have any penalties. It did not have any coercion. There are one or two companies in the United States who sell only to veterinarians, who, for some reasons peculiar to themselves, do not belong to this association. Nobody ever tried to discriminate against them. There are companies who, after one year or so of membership, said that, due to intercompany situations of some kind or another, they could not be a member and they dropped out; nobody tried to keep them in. In some instances, they came back in again after a year or two. Nobody tried to keep them from coming back in, and if any one of these companies should decide today that it has been erroneous in its concept of its duty to the American food supply and say, "I am going to abandon this association and go out and sell to the laity generally," there would be no penalty on them. There is no black list, no boycott of any kind.

Another thing they did, they set up a credit agency. That credit agency worked, functioned, and minimized credit losses. It worked just like any other city credit agency. Each company agreed that it would send into the central authority a list of the names and the amounts of the delinquent accounts of any veterinarians to whom it was selling after, we will say, sixty or ninety days. There was no blacklist. None of the companies said, "We won't sell to any man whose name is sent in." They could use their own judgment. But if you were a credit man for Allied Laboratories, you got those reports every month. "Here is a Dr. Smith of Elmira, Kansas, who owes two companies, one $150 and one $300." That is the information. That credit man could act on it or decline to make the shipment, as he saw fit. But there was no blacklist about it. It was simply informative, and each company used its own policy.

We submit that is a good thing, because we all know that those of us who pay our bills also pay the bills of those who do not pay their bills, and the more there are who do not pay their bills, more of us have to bear the bills of those who do not pay them. So that was a good thing for the industry and for the company.

Now, here is a peculiar thing that the evidence will show. There is a most intense, active, vigorous competition between these different companies in this association. These men all sit here today and they look like they are friendly with each other, but the evidence will show you that each one of them is out after the other fellow's business with high class, intensive sales effort. There is no monopoly charged here, no attempt to corner the market between these companies. Each one of them wants all the other fellow's business that he can get, and the evidence will show you, of course, that they try to get the lay companies' business in fierce competion. They try to convince the customer with a large herd of hogs that he would do better to have Dr. Smith, his local veterinarian, buy his serum from one of these companies and administer it than to send to a mail order house and try to do it himself. So in that sense, they are in active competition with the lay companies.

Now, the evidence will further show you that—I do not want to minimize anything—this isn't one of the giant monopolies that customarily comes before the federal court in anti-trust cases. This is a small business, as counsel has shown you, and

its per cent of the total volume of the drug and medicine business in the United States is small.

There will be another remarkable thing presented to you from the figures of the Bureau of the Census, and that is that in two of the years in question that counsel has mentioned, the total volume of drugs and medicines sold in the United States was around $320,000,000, that is, of all kinds. That same census figure will show that just about half of that was sold direct to the laity and the other half was sold by or through physicians, dentists, and veterinarians. So that evidence as to the proportionate part which these gentlemen play in the total industry will show you that it is just about the proportion that the Census Bureau figures reflect, of half to the laity and half to or for the use of veterinarians.

Most of counsel's opening statement, when he got down to the subject of animal medicines, was devoted to serum and virus. Many of these defendant companies make large lines of animal medicines and supplies. Some of them with over two thousand items.

This indictment, you will recall, covers the whole field of animal medicines and supplies. The reason why the whole field was taken in is something which will probably develop later in the trial, possibly with some regard to the hog serum and virus marketing, which was covered by this marketing agreement. So, the field was enlarged to cover the whole field of animal medicines and supplies and, for that reason, we will have to present to you, by competent evidence, the nature of a large number of these animal medicines, swine erysipelas serum, anthrax vaccines, hemorrhagic septicemia bacterin, brucellosis vaccine—you all know what brucellosis is. It is Bang's disease in cattle, the deadly Malta fever in man, and a disease which is transmissible from cattle to man and from other animals to man.

Now, these men manufacture lines of these antigens, biological products, viruses, bacterins, pharmaceutical products, many of which are dangerous in the hands of anyone but a trained man, and they are indicted here before you on this conspiracy for that whole field of animal medicine. So I should call your attention to that.

I must beg your indulgence. I thought I could get through with this outline in better time than I have, but it seemed necessary to cover this picture. So, in conclusion, I want to ask you to keep in mind, in behalf of these defendans, the fact that this is a criminal case, that these men are charged with a crime, that they come into this court before you, clothed in the mantle of innocence, and that that presumption of innocence stays with each of them throughout this trial unless the prosecution convinces you beyond a reasonable doubt that they are guilty; that that presumption will stay in your mind; that the fact that the inference, if it is capable of two constructions, must go in favor of the defendants and the fact that inferences are insufficient to sustain a verdict of guilty, if they are capable of any other reasonable hypothesis.

Again, in closing, let me say that when you have considered all these facts from which they ask you to draw the inference, these little spots on this periphery, it is our honest belief that you will come to the conclusion that they are gnats up there and they have nothing to do with this great, constructive enterprise which is rolling along to advance the cause of animal health and animal disease control in this country.

We will prove that to you, in addition, and finally, perhaps by words out of the mouth of—counsel referred to himself repeatedly as the Government—by words out of the mouth of the United States government. Many of us just do not understand what the government is, but here is the official Year Book, which will be presented to you, of the United States Department of Agriculture for the year 1942. Now, I believe that is part of the government, too, just the same as the Department of Justice is, and here the government of the United States tells you on page after page and extract after extract with respect to this disease and that disease and this remedy and that remedy, that it should be used and administered only by and under the direction and after diagnosis by a veterinarian. So that the word "Government" must not confuse you in your consideration of this case.

Ladies and gentlemen, I thank you for your careful attention.

(To be continued)

The Future of Man and Veterinary Science

In an article entitled "The Science of Biology and the Future of Man", Professor Anton J. Carlson, University of Chicago (*Science*, Nov. 17, 1944), points out that in a study of all the natural sciences in the curriculum for college freshmen in 16 states, including Ohio, it was found, according to the yardstick used, that psychology and chemistry stood first, zoölogy third, and human biology last, or eighth. What the author attempts to explain at length in the scholarly treatment of his subject is that, in the present educational system, man concerns himself least about what concerns him most. But let the author speak: "Assuming increasing control of infectious diseases and a decrease in the prevalence of war and a not too rapid weakening of the human race by the reproduction and survival of the less fit, it seems clear that *food will some day be the limiting factor of our numbers, if not of our health and efficiency* (italics ours), no matter how much more understanding we may gain of the interior of the earth, of subatomic energy, and of the super-galaxies in the distant heavens. That means that agriculture and foods are clearly *must items* in the teaching of human biology of tomorrow. But why wait till tomorrow?"

Seldom has the food problem, brought down through the centuries by veterinary science, and its relation to "The Future of Man," been so well told. But, all of these serious studies of man and his food fall short because they fail to stress the health of domestic animals as one of the biological sciences which goes begging for attention from the kindergarten up.

APPLICATIONS

The listing of applicants conforms to the requirements of the administrative by-laws—Article X, Section 2.

First Listing

BURT, CLARK E.
Office of the Veterinarian, APO 678—c/o P.M., New York, N. Y.
D.V.M., Washington State College, 1939.
Vouchers: W. A. Lawrence and A. C. Eminger.

CARMELO F., CEDRO V.
Avda. Del Tejar 4062, Buenos Aires, Argentina.
D.V.M., Universidad Nacional de Buenos Aires, 1938.
Vouchers: F. R. Jurado and W. Rucks.

HAIR, V. H.
Bunkie, La.
D.V.M., Kansas City Veterinary College, 1917.
Vouchers: H. A. Burton and C. M. Heflin

HOFFMIRE, COLENZO H.
1220 St. Charles, New Orleans 13, La.
D.V.M., Ohio State University, 1908.
Vouchers: H. A. Burton and C. M. Heflin.

JAMESON, LLOYD E.
188 Outer Drive, Oak Ridge, Tenn.
D.V.M., Michigan State College, 1937.
Vouchers: H. E. Mullen and J. H. Healy.

KEIM, J. KENNETH
207 N. Narberth Ave., Narberth, Pa.
V.M.D., University of Pennsylvania, 1932.
Vouchers: J. D. Beck and D. G. Lee.

KING, JOHN P.
4730 Lenore Dr., San Diego 5, Calif.
D.V.M., Cincinnati Veterinary College, 1912.
Vouchers: H. F. Roberts and E. M. Austin.

RADLOFF, DONALD B.
Conrad, Iowa.
D.V.M., Iowa State College, 1939.
Vouchers: R. W. Johnson and W. H. Riser.

SHULL, ALBERT J.
19640 Carrie St., Detroit, Mich.
D.V.M., Michigan State College, 1943.
Vouchers: E. K. Sales and J. A. Fries.

SIEGEL, MORRIS
Veterinary Station Hosp., Fort Bragg, N. Car.
D.V.M., Cornell University, 1937.
Vouchers: J. R. Underwood and W. O. Slappey.

SPROTT, DARRELL B.
Rt. No. , Box 182, Killeen, Texas.
D.V.M., Texas A. & M. College, 1938.
Vouchers: T. T. Christian and H. H. Pelot.

WILLS, M. H.
Ridgefarm, Ill.
D.V.M., Ohio State University, 1921.
Vouchers: C. C. Hastings and J. H. Nichols.

Second Listing

Burke, H. I., 425 W. 57th St., New York, N. Y.
Ferro, Robustiano B., 6050 S. 35th St., Omaha 7, Neb.
Gendreau, L. A., 67 Willington St., S., Sherbrook, Quebec, Can.
Hewitt, L. L., 1430-15th Ave., Regina, Sask., Can.
Hoyme, K. H., 2402—28th St., Lubbock, Texas.
Jacoby, Alfred M., 135 Boylston Circle, Shrewsbury, Mass.
MacNabb, Andrew L., 126 Colin Ave., Toronto, Ont., Can.
Nadeau, J. D., 25 St. Olivier, Quebec, Can.
Sinai, Harry J., 604 E. Gun Hill Road, Bronx, N. Y.
Snook, George W., Quartermaster Market Center, 13 E. Mt. Royal Ave., Baltimore 2, Md.
Young, F. B., P. O. Box 6, Waukee, Iowa.

Michigan State College

Brattain, Donald B., D.V.M., R. R. No. 2, Liberty, Ind.
Millerick, Thomas I., D.V.M., Box 211, West Salem, Wis.
Thomas, Richard M., D.V.M., 9723 Everts Ave., Detroit 24, Mich.

1945 Graduate Applicants

First Listing

The following are graduates who have recently received their veterinary degrees and who have applied for AVMA membership under the provision granted in the Administrative By-Laws to members in good standing of junior chapters. Applications from this year's senior classes not received in time for listing this month will appear in later issues. An asterisk (*) after the name of a school indicates that all of this year's graduates have made application for membership.

Colorado A. & M. College

MASON, WALTER S. JR., D.V.M.
Clinton, Okla.
Vouchers: A. W. Deem and V. D. Stauffer.

Texas A. & M. College

FOLSE, DEAN S., D.V.M.
4018 Harrison, Kansas City, Mo.
Vouchers: J. H. Milliff and R. P. Marsteller.

Second Listing

Texas A. & M. College

Beerwinkle, Milton A., D.V.M., Route 1, Moody, Texas.
Boyd, Charles L., D.V.M., Grandview, Texas.
Bridges, Charles H., D.V.M., Route 3, Jasper, Texas.
Bumstead, William A., D.V.M., 1115 Jackson, Amarillo, Texas.
Chastain, Jamie N., D.V.M., 1615 Fourth St., Brownwood, Texas.

Colvin, John E., D.V.M., 2219 Kuhio, Honolulu, Hawaii.
Coscia, James A., D.V.M., Rt. No. 2, Box 55, Frayser, Tenn.
Denton, James H. Jr., D.V.M., 310 W. 8th St., Dallas 8, Texas.
Dillon, Gene Douglas, D.V.M., Box 56, Marble Falls, Texas.
Harkrider, Autry N., D.V.M., Box 896, Kilgore, Texas.
Henderson, Edmond A., D.V.M., 3727 0½ Galveston, Texas.
Kelly, Robert J. Jr., D.V.M., General Delivery, Cuero, Texas.
Kelsey, Charles, D.V.M., General Delivery, Denison, Texas.
McCasland, Foy V., D.V.M., Route 3, Goldthwaite, Texas.
McCoy, Kid Jr., D.V.M., Route 1, McLean, Texas.
Maddox, Edward P. III, D.V.M., 2339 Mistletoe Ave., Fort Worth, Texas.
Melius, Thomas W. Jr., Box 9022, Metaire 20, La.
Nash, James E., D.V.M., c/o Mr. M. L. White, Rt. No. 2, Bonham, Texas.
Phillips, B. B., D.V.M., Ladonia, Texas.
Pulliam, James A., D.V.M., Trumann, Ark.
Reed, James E., D.V.M., Box 357, Eagle Lake, Texas.
Richey, Claude H., D.V.M., 1312 Newning Ave., Austin, Texas.
Simpson, Akin M., D.V.M., Gail Route, Big Spring, Texas.
Waldhofer, Bernard, D.V.M., Box 275, Lamarque, Texas.
Williams, Donald L., D.V.M., 2818 Frankfort St., El Paso, Texas.

U. S. GOVERNMENT

New Animal Research Laboratory.—The Dairy and Poultry Branch of the War Food Administration has established a pathological laboratory in Washington, D. C., better to serve its purposes in the field of food hygiene, especially of poultry. Dr. Paul J. Brandly (KSC., '33), younger brother of Dr. C. A. Brandly, of the Regional Research Laboratory, at East Lansing, Michigan, has been placed in charge of its operation and development.

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Change and Expansion in Poultry Inspection.—By mutual arrangement between the Surgeon General's Office and the War Food Administration, the Dairy and Poultry Branch of WFA will henceforth take over all of the inspection of eviscerated and lend-lease poultry for the armed forces as soon as possible in addition to its work for the civilian markets. The change promises to make the Branch the most extensive meat-inspection service ever developed. It already directs veterinary inspection at more plants than the BAI, and when its new forces have been mobilized, it will supervise the hygiene of a comparable, if not larger, poundage of meat. Dr. W. S. Buchanan of the Chicago poultry-inspection force has been loaned to the WFA to aid in the development of the expanded program.

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Dr. W. G. Reed Appointed Chief of Insecticide Division, WFA.—A veterinarian has been appointed chief of the Insecticide Division, Livestock and Meats Branch, Office of Marketing Services, according to announcement made by the War Food Administration on March 1, 1945. Dr. Webster G. Reed (CVC., '18) succeeded Curtis C. McDonnell, whose retirement became effective on that date. The latter is a chemist and had served since 1928 as chief of the Insecticide Division, which until 1940 was under the Food and Drug Administration.

After graduation from the Chicago Veterinary College, Dr. Reed carried on a general practice in Marble Rock, Iowa, until he went with the USDA in 1929. In 1931, he entered the meat inspection service where he has held a number of important technical and administrative positions.

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Farm Veterinarians Still Eligible for New 1942 Automobiles.—An OPA release dated March 14, 1945, contains the information that regularly licensed "farm veterinarians who serve agricultural establishments" comprise one of the eight groups listed as eligible for new 1942 automobiles under the stringently restricted eligibility recently put into effect because of the dwindling supply of new cars. The previous list contained 26 groups of eligibles. Mainly, the change eliminates home-to-work driving as a qualification.

Need and serviceability of present cars are the tests which establish eligibility for both new and used 1942 cars, and these tests are now more restricted than formerly.

Among the groups retained on the new car eligibility list, in addition to farm veterinarians, are certain government employees; physicians, surgeons, and mid-wives; public health nurses; ministers; members of the armed forces for official business; taxicab owners and car-rental owners.

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Dog Disease Control Bill Introduced into Congress.—H. R. 1986, a bill "to enable the Secretary of Agriculture to suppress and extirpate contagious, infectious, and communicable diseases of dogs and other carnivorous animals," was introduced into the House of Representatives on Feb. 5, 1945, by Congressman Edward H. Rees, of Kansas, and referred to the Committee on Agriculture.

The bill would amend sections 1 to 11 of the Act of May 29, 1894, establishing the Bureau of Animal Industry, and would bring dogs and other carnivorous animals, whether domestic or

wild, under the same supervision for the suppression and extirpation of contagious diseases as now applies to domestic animals, which term is not now interpreted to include dogs.

The bill also provides for amendments to the Act of Feb. 2, 1903, and the Act of March 3, 1905, relating to the interstate transportation and the quarantine of livestock so as to include dogs and other carnivorous animals.

Presumably, the bill, if passed, would enable the federal Bureau of Animal Industry to undertake control work, in coöperation with states which adopt acceptable plans and methods, on such diseases of carnivora as rabies, and would also permit the Bureau to set up measures to guard against importation of foreign diseases which might be introduced by war dogs returned from foreign countries.

AMONG THE STATES

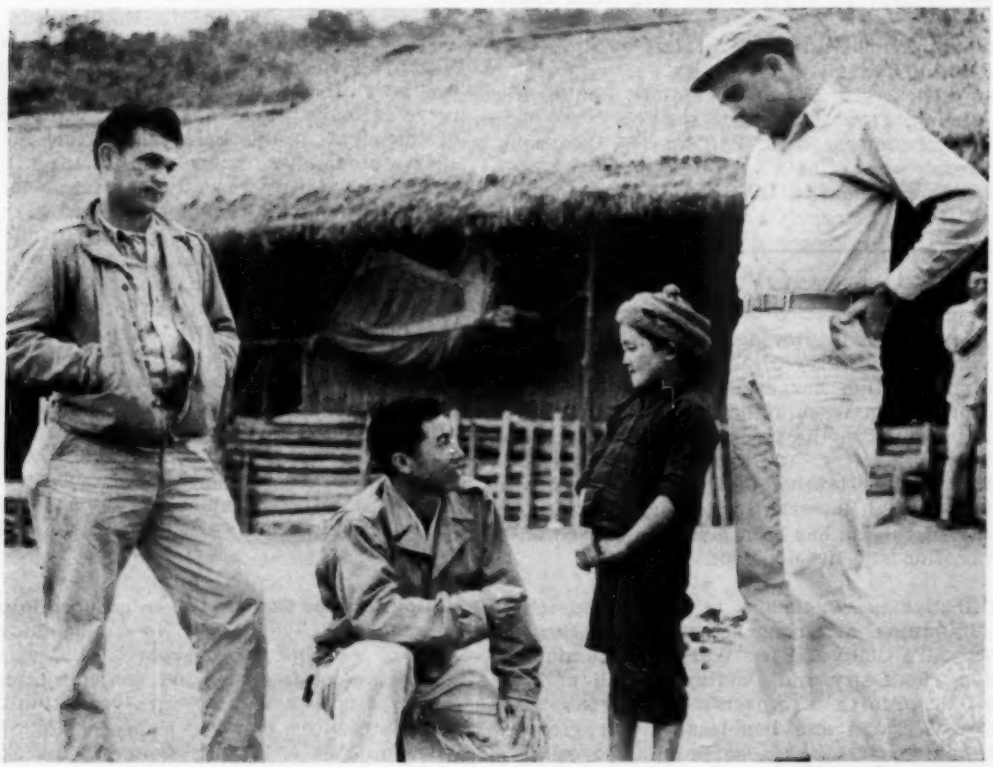
Arkansas

Rabies Rages.—Dr. Frank Hurlbut, retired BAI veterinarian of Yellville, sends a clipping from the *Arkansas Gazette* of February 9, showing that the incidence of rabies among foxes has heightened to such a degree in Union County that State Veterinarian J. S. Campbell decided that it was necessary to vaccinate 2,775 dogs. Expert trappers of the Fish and Game Commission were also called in to help to exterminate the disease.

California

"Vital Research." — McGillivray, Hanna, Knott, and Weier, College of Agriculture, University of California, Davis (*Science*, Feb. 9,

Californians Make the Headlines



—U. S. Army Signal Corps

From the Chinese Combat Command, U. S. Army, operating on the rugged Salween front, comes news of (left) Capt. Ben H. Dean, of Vistlia, veterinary officer on duty with the liaison service of the Chinese Expeditionary Force, Major Albert Young, medical officer, of San Francisco (chatting with a Chinese lad), and Capt. Russel R. Simpson, signal corps officer, of Inglewood. The operation in which these troops were engaged was the opening of the famous Stillwell Road for transporting supplies from India.

1945), define the study of plants and animals for the purpose of feeding, clothing, and sheltering the human race as "vital research," but first point out that Webster defines "vital" as "essential to the continuation of life" and "necessary to life," and that while the benefits derived from research in agriculture are commonplace in times of abundance they become dramatic when scarcity arrives. Thus the authors have set down the text of the long sermon all the world ought to hear and to heed, not only in war but always.

• • •

Dr. Carr Appointed Head of Division of Animal Industry.—Effective Feb. 1, 1945, Dr. A. K. Carr of Los Angeles, became chief of the Division of Animal Industry, State Department of Agriculture, Sacramento. He succeeds to the post vacated by the advancement of Dr. C. U. Duckworth to assistant state director of agriculture last year.

Announcement of Dr. Carr's appointment from a State civil service list, established as a result of a statewide examination, was made by State Director of Agriculture A. A. Brock.

Dr. Carr has been in charge of the administrative work for the Division in Los Angeles for the past four years. He is a graduate of the McKillip Veterinary College, class of 1917. During the first World War, he was an army officer and served in France.

Dr. Carr entered the service of the State Department of Agriculture in 1928 through civil service appointment as field veterinarian. He steadily advanced and in 1940 became supervising veterinary livestock inspector, in charge of the Los Angeles office of the Bureau of Livestock Disease Control, Division of Animal Industry. During the period 1930-1940, he was Los Angeles port veterinarian, in charge of foot-and-mouth disease prevention work, coöperating with federal, state, county, and public health officials.

• • •

Southern California.—The Southern California Veterinary Medical Association met jointly with The Small Animal Veterinary Medical Association Feb. 21, 1945, at the hospital of N. L. McBride Jr., Pasadena.

The program consisted of moving pictures on surgery.

Officers for the coming year are: Drs. J. L. Sullivan, *president;* H. C. Utley, *vice-president;* and C. M. Baxter, *secretary-treasurer.*

s/C. M. BAXTER, *Secretary-Treasurer.*

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Molybdenum Poisoning in Heifers.—The State Department of Agriculture and the Division of Veterinary Science of the University report (*California Wool Grower*, Jan. 30, 1945) chronic injury suffered by heifers in San Joaquin Valley from molybdenum poisoning acquired on pasture. This light metallic element was isolated in the soil, hay, and organs of the affected animals. Scours and bone derangement are among the symptoms pointed out. Change of feed stopped the trouble.

Idaho

Dr. Schneider Again Appointed Director of Bureau of Animal Industry.—Dr. Arthur P. Schneider, for the past two years employed by the California Division of Animal Industry, was again named to head the Idaho Bureau of Animal Industry, effective Jan. 1, 1945. He first

Dr. Arthur P. Schneider

served in this capacity in 1941 and 1942 under Governor Clark. After receiving his veterinary degree from the State College of Washington in 1938, Dr. Schneider was employed with the federal Bureau of Animal Industry and was stationed in Idaho prior to his first appointment as director of the state's livestock sanitary service.

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Illinois

Epidemic of Ringworm.—An epidemic of ringworm, which started in the eastern part of the United States recently, has swept westward to Illinois where hundreds of school children are now [February] affected with what is reported to be the severest epidemic of this fungus infection in the history of the country.—*Illinois Health Messenger.*

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Illinois-Indiana Veterinary Medical Association.—The Association held its spring meeting March 16, 1945, at the Rod and Gun Club, Bick-

nel, Ind. The program included the following:

Dr. B. L. Strohl, Paris: "Problems of the Practitioner of Today."

Dr. J. L. Axby, state veterinarian: "Disease Control Legislation Enacted by the 1945 General Assembly."

s/H. F. PAGE, *Secretary-Treasurer.*

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Chicago Association.—The Association enjoyed a rare treat at the monthly meeting held at the Palmer House March 13, when Dr. Hugh A. Kuhn, distinguished eye, ear, nose, and throat specialist, of Hammond, Ind., addressed the session on "Some Ophthalmological Observations." Dr. Kuhn is known among veterinarians not only for his elaborate clinic and entourage at Hammond but also for his keen interest and understanding of the contributions of animal pathology to the practice of medicine.

s/W. A. YOUNG, *Secretary-Treasurer.*

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Personal.—Dr. Cliff D. Carpenter (Corn., '20) has been elected president of the Institute of American Poultry Industries, of which he was formerly executive manager.

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Get the Money.—H. G. Waechter of the Owl Drug Store in Quincy tells the readers of *American Druggist* that "they are really missing something if they don't go after the veterinary business."

Indiana

Allied Laboratories Board Chairman Deceased.—James E. Bartlett, 78, chairman of the board of Allied Laboratories, Inc., and former president of Pitman-Moore Co., of Indianapolis, died at his home in Fort Lauderdale, Fla., on Feb. 23, 1945. Trained in chemistry and pharmacy, he had devoted himself for more than a half century to the pharmaceutical and biological industries and became a leading figure in them.

After graduation from the Philadelphia College of Pharmacy, Mr. Bartlett accepted a position with Parke, Davis & Co., Detroit, and served that company in various capacities, from analytical chemist to president. In 1923, he acquired a major interest in the Pitman-Moore Company and was president until 1935; in 1929, he helped to organize the Allied Laboratories, Inc., of which Pitman-Moore has since been a division.

Mr. Bartlett was a staunch friend of the veterinary profession and a firm believer in the value of a competent veterinary service for the welfare of the livestock industry; a belief which has been reflected in the policies of the Pitman-Moore and Allied Laboratories organizations.

He is survived by his widow; one son, M. C. Bartlett, an executive of Pitman-Moore, and two grandsons.

Iowa

Personal.—The War Department has announced the promotion of Major Frank A. Todd (I.S.C., '33), of Merrill, to the rank of lieutenant colonel. Colonel Todd has been a staff veterinary officer of the European Civil Affairs Division. He was commissioned in the Regular Army in 1935, went overseas in 1941, and is remembered as the veterinary officer of the Iceland Base Command who established and maintained high sanitary standards for the American troops by collaborating with the government and the people of Iceland in respect to the health of their domestic animals.

Kansas

Meat and Poultry Inspection Bill.—House Bill, No. 273, introduced in the General Assembly, provides for a meat and poultry inspection section within the state board of health which is to have a veterinarian in charge. The bill defines "veterinarian" as a duly qualified, graduate veterinarian licensed to practice within the state and approved by the Kansas Veterinary Medical Association. Packing plants, sausage plants, and poultry dressing plants are specially singled out as places to institute sanitary inspection.

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State Association.—The program for the forty-first annual meeting of the Kansas Veterinary Medical Association held at Emporia, Jan. 22-23, 1945, as published in the Association's bulletin for February, was featured by a comprehensive, over-all report on the professional and technical problems by each of the district's representatives. The report was outlined at a pre-session meeting of the delegates comprising Drs. E. F. Kubin, J. A. Bogue, E. E. Leasure, R. C. Foulk, R. F. Coffey, Ben Shambaugh, Jr., K. R. Dudley, and T. P. Crispell. The professional questions touched were membership, state board activities, disease control (brucellosis, tuberculosis, anaplasmosis), and the pending meat and poultry inspection law.

The officers elected were Drs. George A. Rathman, Topeka, *president;* J. F. Knappenberger, Hutchinson, *vice-president;* Charles W. Bower, Topeka, *secretary-treasurer* (continued); E. E. Leasure, Manhattan, *member of the Board of Directors.*

s/CHARLES W. BOWER, *Secretary-Treasurer.*

Kentucky

Central Association.—At a dinner meeting held Feb. 1, 1945, at Lexington, Dr. Harold Holmes, Lexington, was elected president of the Central Kentucky Veterinary Medical As-

sociation, to succeed Dr. Arthur Kay, of Frankfort. Drs. F. C. Hull and L. M. Roach, both of Lexington, were named vice-president and secretary, respectively.

Dr. V. T. Rose, Elkton, president of the State Association, discussed legislation affecting the Kentucky veterinarian. Other speakers included Drs. E. R. Frank, of the Kansas State College, Manhattan, and C. S. Bryan, Michigan State College, East Lansing.

s/L. M. Roach, *Secretary.*

Louisiana

Educational Exhibit.—The state association is planning to set up an exhibit in the Agriculture Center of the University campus portraying the work of the veterinary profession and also plans to prepare an educational booth for use on various occasions. Suggestions from the American Foundation for Animal Health and the American Veterinary Medical Association have been solicited.

Maryland

General Kelser on Preventive Medicine Program.—At the Conference on Preventive Medicine held in Baltimore, Feb. 14-16, 1945, Brig. Gen. R. A. Kelser, director, Veterinary Division, Surgeon General's Office, spoke on Army veterinary activities. The conference was also addressed by a number of other members of the Surgeon General's Office.

Massachusetts

Study of World's Food Production.—The Massachusetts Institute of Technology has established a division of food technology to study the postwar problems of the world's food production, including the improvement of products, and methods for retaining natural flavors, and nutritive properties of processed foods.—*Science, Feb. 9, 1945.*

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State Association. — Important professional questions were slated for discussion at the monthly meeting of the Massachusetts Veterinary Medical Association, held at the Hotel Vendome in Boston Feb. 28, 1945. These were:

1) Drug Store Sales of Veterinary Products to Laymen.
2) Advertising by Veterinarians.
3) The Sale of Biological and Pharmaceutical Products by Veterinarians.
4) The Maintenance of an Efficient Professional Service.

s/H. W. Jakeman, *Secretary.*

Michigan

Twenty-second Annual Conference for Veterinarians.—The conference was held at Michigan State College, Jan. 24-25, 1945. It opened with a clinic which was devoted to demonstrations on sheep, swine, and cattle. A poultry clinic completed the first morning session.

After greetings by Dean Giltner, the afternoon session of the first day was marked by discussions on penicillin, trichomoniasis, and hog cholera vaccination problems, presented by Drs. A. S. Schlingman, B. B. Morgan, and H. C. H. Kernkamp, respectively.

The evening program was in charge of the Junior A.V.M.A. It opened with well-selected entertainment numbers and terminated with moving pictures entitled: "Sentinels of Milk"; "Surgery of the Bovine Eye"; and "Vesicular Diseases of Animals." There was just one speech—a short talk by Dr. Umberto Ruiz of Lima, Peru, who is at present a M.S.C. student.

The second morning, Dr. G. H. Hopson presented a demonstration on milking machine sanitation and mastitis control which was very well received. The morning session was completed by Drs. H. D. Anderson, Michigan Health Department, and H. C. H. Kernkamp, who discussed "Intravenous Work and Needle Care" and "Dietary Deficiency Diseases of Swine."

At the concluding session, Dr. B. J. Killham gave a brief report on war and postwar problems confronting the veterinary profession. The subject of Cattle Practice Problems was presented in a very pleasing manner by Dr. F. M. Lamoreaux. The concluding number was a panel discussion on endocrines, participated in by M.S.C. staff members and many of the attending practitioners.

Interest in the sessions was good and the attendance—273—set a new record.

s/B. J. Killham.

Minnesota

Hog-Cholera Law Upheld. — The 22-year-old law regulating the use, sale, and distribution of hog-cholera antiserum and virus was upheld in a ruling handed down by Judge Harold Baker of the Renville County district court. The constitutionality of law and also the validity of the State Livestock Sanitary Board were attacked by Vernon Anderson, a farmer. Judge Baker not only discharged the restraining order but directed the county attorney to institute criminal proceedings against the plaintiff for not complying with the law.

The Judge, however, declared unconstitutional the part of the livestock law providing for the appointment, by the governor, of one member of the Livestock Sanitary Board on recommendation of the Minnesota Livestock Breeders Association.

Missouri

Animal Health Institute Meeting.—More than 100 members of the Animal Health Institute, which is made up of producers and distributors

of "health products," met in Kansas City January 9 and 10. Among the new officers elected were Drs. J. E. Salsbury, Sivert Eriksen, Frank R. Jones, and T. B. Huff. Among the actions taken were proposals to amend the Food and Drug Act so as to remove all forms of advertising from that authority, and to provide that the United States Bureau of Animal Industry give legal approval to labels for new and improved products. In the sphere of organized veterinary medicine, the Institute is best known for advocating the free-for-all distribution of "animal medicine and supplies," which a jury in the Federal District Court of Northern Illinois inferentially disapproved in February in the case of United States vs. Associated Serum Producers.

Montana

Tularemia in Sheep.—The extent to which tularemia is a hazard to the sheep industry is under investigation by the U. S. Public Health Service, Rocky Mountain Laboratory, at Hamilton. Probable victims and informants among sheepmen and sheepshearers are being sought.

New Hampshire

Triplet Fawns.—The front cover of *Science News Letter* of Jan. 6, 1945, carries the picture of fawn triplets born on the deer farm of Frank W. Haldwin, at Pittsburg, an unusual happening. Twin fawns are perhaps more common than single births, but there are few triplets on record for captive deer, the experts say.

New York

State Association.—The Veterinary Medical Association of New York City, Inc., met March 7, 1945, at the Hotel New Yorker. A round-table discussion on rabies was presented, including the following subjects and speakers:

Dr. James E. Assing, former member of New York Health Department: "Diagnosis of Rabies."

Dr. C. R. Schroeder, Pearl River: "The Habel Test."

Dr. J. A. S. Millar, Deal, New Jersey: "Control of Rabies in New Jersey."

Dr. C. P. Zepp, New York City: "Pitfalls of Federal Control."

Dr. E. R. Cushing, president of the association, was chairman of the round-table discussion.

c/C. R. SCHROEDER, *Secretary.*

• • •

Radio Broadcasts.—A member of the New York State Veterinary Medical Society presented "Timely Practical Veterinary Information," over WEAF at 6:30 a.m., Feb. 27, 1945. This was a part of "The Modern Farmer Program."

On March 1, 1945, at 12:30 p.m., over WGY, Drs. M. G. Fincher, Ithaca, and S. R. Roberts, Richmond, Calif., spoke on "Breeding Troubles in Cattle," which was a part of the "Farm Paper of the Air" program.

• • •

Entomologists Meet.—When the fifty-sixth annual meeting of the American Association of Entomologists was held jointly with the Entomological Society of America, at Hotel New Yorker, Dec. 13-15, 1944, almost an entire afternoon was devoted to papers on the usefulness of DDT in agriculture, and an entire day went to a round-table discussion on its merit as an insecticide in general. There was a large attendance from the Army, Navy, and Public Health Service.—*From Science, Jan. 19, 1945.*

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Westchester Society Rabies Forum.—On January 17, in the Little Theater of White Plains, the Westchester Veterinary Medical Society conducted a public forum on rabies for the purpose of informing the general public, especially practicing physicians and persons active in animal protective societies, about rabies and all the varied problems of its control and eradication.

The speakers were James E. Perkins, M.D., director of the division of communicable diseases, New York State Department of Health, and James Assing, D.V.S., formerly in charge of rabies control, New York City Department of Health. Mr. T. J. Ahearn, superintendent of schools of Mamaroneck, was the moderator. Dr. Perkins dwelt on the broad public health aspects of dog licensing and control, rabies, and the possibility of eradicating this disease through periodic inoculations with antirabic vaccine. Dr. Assing described his many years of experience with atypical cases of rabies in dogs and human beings, citing specific instances of rabies contracted by animals or by man through neglect of bites.

Dr. William Holla, commissioner of health, of the Westchester county health district, spoke on rabies and dog control in the county. He proposed a centralized agency to control all dog licensing, the apprehension of stray dogs, and vaccination of all dogs in the county by veterinarians, this to be paid for with part of the dog license fees. This forum was well attended, and questions from the floor on all aspects of the rabies problem were answered by the speakers.

The Westchester Veterinary Medical Society was originally organized as an informal club of practitioners by Dr. O. E. McKim, of Port Chester, to achieve greater coöperation among veterinary practitioners in the county in the handling of various professional problems. During the first few years, it was successful in inducing several humane societies to abandon the idea of establishing clinics for dogs under their auspices, these clinics to be attended by local

veterinarians. It was shown that veterinary practitioners were willing, at all times, to render services for the pets of indigent people, and that clinics, no matter for what humanitarian purposes established, would develop into society-operated practices of no special value to animal owners but of great detriment to established veterinary practices. The club was also instrumental in blocking the proposed construction, in Yonkers, of a palatial pound which would have cost the city over $40,000, the main features of which were to be a club room for the local animal societies and a sick bay for the treatment of animals, in spite of the fact that there were four veterinary hospitals in the city.

Another accomplishment of the Society was the total elimination of telephone book advertising by veterinarians in Westchester.

In the latter part of 1943, it was realized that the group could function more effectively as a formal organization. Application was made to the New York State Veterinary Medical Society for affiliation and formal organization was completed in February, 1944. Dr. Roy Spaulding, of White Plains, was elected the first representative to the Executive Board of the state society.

During the past year, the Westchester Society has obtained the coöperation of kennel clubs conducting shows in Westchester county so that the veterinary supervision of these shows is under the control of the Society, which appoints several of its members to attend each show without undue publicity for any individual. The forum on rabies is another example of the activities and aims of this society. The membership includes every practitioner in Westchester county, and whenever a veterinarian enters practice in the county, he is invited to become a member and share in its benefits.

It is felt that local veterinary organizations need not stress professional or scientific papers at their meetings, as these matters are better taken care of by larger associations. However, there is a wide field of usefulness in coöperating with other local organizations; the Westchester Society feels that it is pioneering in this field and would welcome reactions concerning this type of veterinary organization activity.

s/S. M. APPLEBY, *Secretary.*

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Stop Racing—No Protest.—In the spirit of true sportsmanship, the Thoroughbred Association, at a directors' meeting in New York City, Dec. 27, 1944, notified War Manpower Mobilization Director James F. Byrnes that in compliance with the government's direction all of the 33 tracks under its jurisdiction would be closed without protest on Jan. 3, 1945. Moreover, steps were being taken to aid horsemen, jockeys, trainers, and others associated with racing during the period of the suspension.

North Carolina

Annual Conference for Veterinarians.—Approximately 100 veterinarians attended the seventh annual conference held at North Carolina State College, Raleigh, Jan. 23-26, 1945. The following program was given:

Earl Hostetler, M.S., professor of animal husbandry, State College: "The Swine Industry in North Carolina."

H. E. Pinkerton, D.V.M., Fort Dodge, Ia.: "Swine Erysipelas" and "Swine Diseases."

L. A. Dykstra, D.V.M., Galesburg, Ill.: "Differential Diagnosis of Swine Diseases," "Hog Cholera," "The Hog Cholera Vaccines B.T.V. and Crystal Violet," and "Cellular Changes in the Gall Bladder as an Aid to Diagnosis of Hog Cholera."

A panel discussion on Heredity and Disease was presented with **R. E. Comstock,** Ph.D., associate in animal industry, State College, as chairman; and **C. Nash Herndon,** M.D., the Bowman Gray School of Medicine, Winston-Salem; and **C. H. Bostian,** Ph.D., associate in poultry genetics, State College, participating.

W. C. Glenney, D.V.M., Tri-City Animal Hospital, Elgin, Ill.: "Medical and Surgical Cases" (Film), "Dairy Cattle Practice," and "Mastitis and the General Practitioner."

A. C. Kimrey, B.A., professor in extension dairying, State College: "The Future of the Dairy Industry in North Carolina."

Joseph W. Beard, M.D., Duke Medical School, Durham: "The Physical and Chemical Characters of Human and Swine Influenza Viruses."

W. E. Petersen, Ph.D., professor of dairy husbandry, University of Minnesota, University Farm, St. Paul, Minn.: "The Physiology of Milk Production" and "Milk Production and Its Relationship to Mastitis."

J. A. Arey, B.S., head, Dairy Extension, State College: "Mastitis from the Milk Producer's Standpoint."

L. E. Starr, D.V.M., Roanoke, Va.: "A Review of the Pathology of Mastitis."

A. Eichhorn, D.V.M., consultant in animal disease control, New York City: "Brucellosis."

Wiley D. Forbus, M.D., Department of Pathology, Duke University School of Medicine, Durham: "A Granulomatous Disease in Hogs with Striking Resemblance to Hodgkin's Disease in Human Beings" and "Brucellosis in Swine."

R. R. Birch, D.V.M., Ph.D., director, Veterinary Experiment Station, New York State Veterinary College, Cornell University, Ithaca: "Calfhood Vaccination."

The panel discussion on brucellosis was participated in by **Drs. A. Eichhorn; Wiley D. Forbus; R. R. Birch;** and **David T. Smith,** M.D., School of Medicine, Duke University; also **W. L. Bendix,** assistant state veterinarian, division of animal industry, Richmond, Va.; **Wm.**

Moore, state veterinarian, Raleigh; and **Drs. E. W. Boyette**, Smithfield; **Branch Moore**, Newbern; and **W. A. Hornaday**, Greensboro.

J. Raymond Curry, D.V.M., Washington Veterinary Hospital, Washington, D. C.: "Current Problems in Small Animal Practice."

Dr. C. D. Grinnells, State College, arranged the program and was the director of the conference.

s/J. W. BROWN, Tarboro.

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Better Farm Workstock.—An article entitled "Building Better Farm Workstock" by F. H. Jeter in *American Druggist* of January, 1945, emphasizes the benefits druggists derive from the coöperation of "extension livestock specialists, county agents, and the local veterinarians," who examine free of charge thousands of horses brought to neighborhood clinics.

North Dakota

Corrigendum.—In abstracting the 37th and 38th annual reports of the North Dakota Livestock Sanitary Board (see January JOURNAL, p. 69), it was inadvertently stated in discussing the veterinary personnel situation that "the few young men who have come into the state are working full time for the Livestock Sanitary Board." Dr. T. O. Brandenberg, state veterinarian, points out that a few young men have located in the state in practice and only one was working full time (two others refused appointment) for the Board but has since entered practice, the latter being considerably more lucrative work than the state can offer.

Also, in naming the principal diseases of livestock in North Dakota in the order of their *incidence*, the abstract listings were based on tabulated data of reports made by agents of the Board and by practicing veterinarians, whereas the "General Survey of Livestock Losses in North Dakota for 1943-44" contained in the reports rated these diseases in a somewhat different order of importance based on *losses*.

Ohio

Geo. W. Lies, practicing veterinarian of Fort Recovery, was the "Keep 'em Healthy" guest on the station WLW "Everybody's Farm Hour" broadcast on March 3, 1945, at 11:30 a.m. CWT. His subject was "Calf Scours."

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State Leads in Goats.—It is not generally known that Ohio leads all other states in goat production.—*From The Goat World*.

Ontario

New University Proposed.—A movement is on foot to amalgamate the different institutions at Guelph into a new university. A committee, on which there is no representative of the Ontario Veterinary College, was appointed to examine the project, although press reports indicate that the O.V.C. will be included in the amalgamation. "This scheme," says the *Canadian Journal of Comparative Medicine*, "should not be a cloak and disguise for the Ontario Agricultural College to take over veterinary education."

Oregon

State Association.—The Oregon Veterinary Medical Association met March 17, 1945, at Eugene, as the guests of Dr. W. N. Swangard. The program included the following:

Dr. E. D. Furrer: "Brucellosis and Its Relationship from Animal to Man." (Film on surgical and clinical subjects.)

Dr. L. G. Helterline: "Flash Pasteurization." (With a visit to a dairy.)

s/WM. E. RUGGLES, *Secretary*.

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Personal.—Dr. C. H. Seagraves read a paper on "Undulant Fever in Domestic Animals," at the meeting of the Multnomah County Medical Society, Feb. 7, 1945.

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Pennsylvania

Colonel Mallan Decorated.—Colonel Daniel Mallan (Corn., '17), V.C., U.S.A., of Harrisburg, received the Bronze Star Medal for meritorious

—Signal Corps., U. S. Army Photo

Colonel Daniel Mallan

service in the southwestern Chinese theater for the period of March-September, 1944. The Colonel is receiving the congratulations of Brigadier General Frank Dorn, commander of the ground forces of the expedition.

Saskatchewan

Blackflies Kill Livestock.—On June 1, 1944, blackflies *(Simulium arcticum)* swarmed over the MacDowall area, 20 miles southwest of

Prince Albert, and caused the death of 132 cattle valued at $20,000. The area which lies in the narrow strip between the two branches of the Saskatchewan River has had extensive outbreaks of this pest in past years. Cameron reported the loss of 100 cattle in an outbreak there in 1922. Single outbreaks in southern Europe have accounted for the loss of 6,000 domestic animals. Serious losses have occurred in the Mississippi Valley. The swarms come and disappear suddenly, and many animals upon which they light die within twenty-four hours. The flies are vicious biters of livestock, especially horses and cattle. The flies strike at the less hairy parts of the body of these animals (belly, inguinal region, axilla, scrotum), and at sheared sheep; the animal attacked may die from fifteen minutes to two hours after showing heavy, jerky breathing and muscular trembling. Two live animals examined twenty-four hours after being struck were almost completely recovered. —[*J. L. Millar and J. G. Rempel: Live Stock Losses in Saskatchewan due to Blackflies. Canad. J. Comp. Med. and Vet. Sci., 8, (Dec. 1944): 334-337.*]

South Dakota

Record Corn Yield.—George L. Renner, Poland China breeder, near Sioux Falls, is credited with having raised 176.9 bushels of corn per acre. Anyone know of a better record? The figure was released by a hybrid seed-corn producer, but is reported editorially in the *Breeder's Gazette.*

Texas

Work on Fat Metabolism.—The National Live Stock and Meat Board, Chicago, has made a gift of $7,200 to the School of Medicine, at Galveston, of the University of Texas, in support of work on fat metabolism under the direction of Dr. Arild E. Hansen, pediatrist of the William Buchanan Foundation of Texarkana.

Virginia

State Association.—At the winter meeting of the Association held at Roanoke, Jan. 30-Feb. 1, 1945, the following officers were elected: Drs. L. E. Bowen, Lynchburg, *president;* C. R. Pastors, Staunton, *first vice-president;* E. P. Johnson, Blacksburg, *second vice-president;* R. D. Hatch, Blacksburg, *secretary;* and T. P. Rowe, Richmond, *treasurer.*

s/E. P. Johnson.

Wisconsin

Army Veterinary Service Praised.—In a talk before the Janesville Rotarians February 12, Major S. L. Hendriks, of the Army Air Force, praised the Veterinary Corps for its work in meat and milk hygiene and for the care of military animals (horses, mules, dogs, pigeons), all-in-all, for its contributions to the health of soldiers. The rejection of 4 per cent of the 22 milion pounds of meat daily accounts for the wholesomeness of the soldiers' rations, the speaker pointed out. The Major was introduced by Dr. L. J. Lewis, of the AVMA.—*From the Janesville Daily Gazette.*

Foreign

Australia

Reverse Lend-Lease.—Up to April 1, 1945, American troops in the south and southwest Pacific received 41,925,000 qt. of fresh milk from Australia and 31,534,050 qt. of milk and cream from New Zealand. In 1943, these two countries delivered products equivalent to 9,900,000,000 qt. of milk.—*From Certified Milk.*

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Food Shortage.—"There will be no surplus of food for a long time" says the editor of *Food Industries,* for December, 1944. Australia is suffering a drought of calamitous proportions, the worst since 1902 and 1914. From many sources come complaints of lack of rainfall. The wheat crop will be less than half of last year's. For more than six months, sheep ranchers have been unable to provide fodder or buy it, and as a consequence exportable lamb will be cut in two. So, the present dependence of American and British troops on Australia for meat is important because there will be a heavier demand for shipping as the need for more shipping mounts with the expansion of military operations, toward China and Japan. China's need for food is enormous and the food situation of Russia is "unbelievably" difficult. The plea is for the conservation of food in the United States and Canada.

Britain

Milk Production Increased.—For the year ending May 30, 1944, the output of milk in England and Wales was 10 per cent greater than for the prewar year, 1938-1939, and the consumption of fluid milk was up 37 per cent. —*Certified Milk.*

Cuba

Dr. Mario Stincer (HAV., '39) has been appointed municipal veterinary inspector for the city of Havana and assigned to the Matadero Industrial, largest abattoir in the island. Meat inspection is compulsory throughout Cuba and is conducted by the government.

Egypt

Personal.—Drs. Maurice L. Tainter and Chester M. Suter, of the Winthrop Chemical Company, have arrived in Cairo on invitation

of the Egyptian government to assist in research on tropical diseases, mainly malaria, schistosomiasis, and trachoma.—*Science, Feb. 9, 1945.*

France

Horse Racing Resumed.—The looting of the racing stables by the Germans during their occupation has set racing back many years in France. Breeders will have to fall back on England for stock to replenish the loss of famous stallions and mares which were taken into Germany, among them Pharis valued at more than 15 million francs ($500,000). What became of some 300 fine sires is not known. Nevertheless, when the track at Auteuil opened after the liberation of Paris, there were seven races on the card the first day. Says *The Thoroughbred Record*, "Auteuil and the two flat tracks consider it a poor day when they [the pari-mutuels] don't average 23 million francs."

Saipan

Outbreak of Dengue.—An epidemic of dengue—mosquito-borne protozoan disease of the tropics—broke out among American troops during the invasion, which necessitated a mosquito survey in the more thickly populated places to bring it under control. A solution of DDT, disseminated by mechanical power sprayers and airplane, brought dramatic results in the reduction of larvae and adult mosquito and fly populations. Quoting: "This experience re-emphasizes the effectiveness of command action in disease prevention. . . . under Medical Department recommendation."—*Bull. U. S. A. Med. Dept., January, 1945.*

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The American troops expect to have 5,000 acres under cultivation, the American way, in the Marianas, where corn, cabbage, tomatoes, peppers, watermelons and cantaloupes are taking the place of the sugar cane once grown by the Japanese. Farmers dressed in khaki are making the transformation. The goal is 16 million pounds of vegetables per month. Besides, on the rich soil of Saipan, pineapples, bananas, and other delicious fruits are being grown, along with vegetables, on land that has lain fallow for centuries. Corn ripens in sixty-five days on land cleared by bulldozers, and insect pests are repelled by modern chemicals, the lack of which has kept the natives in poverty. The surrounding sea teems with fish. Hundreds of American soldiers will never go home to stay, Perry Hull tells the readers of the *Chicago Sun*.

Trinidad

Dr. H. V. M. Metivier was appointed foreign corresponding secretary for Trinidad, B.W.I. last November by President James Farquharson.

BIRTHS

To Dr. (WASH., '42) and Mrs. Donald E. Jasper, Division of Veterinary Medicine, University of Minnesota, St. Paul 8, Minn., a son, Donald Richard, Nov. 9, 1944.

To Capt. (A.P.I., '41) and Mrs. Neil G. MacEachern, Suffolk Co., A.A.F., Westhampton Beach, L. I., N. Y., a daughter, Adair Worth, Nov. 25, 1944.

To Dr. (O.S.U., '43) and Mrs. Hugh L. Lamb, 701 Davenport Road, Knoxville, Tenn., a son, Robert Hugh, Dec. 13, 1944.

To Dr. (A. P. I., '42) and Mrs. Daniel E. Kallman, c/o Dr. A. C. Yow, P. O. Box 38, Henderson, N. Car., a son, Steven Mark, Nov. 14, 1944.

To Capt. (A.P.I., '36) and Mrs. Morris D. Schneider, 7th Service Command Medical Laboratory, Ft. Omaha 11, Neb., a daughter, Sharon Beth, Nov. 15, 1944.

To Capt. (I. S. C., '42) and Mrs. Don Ward, 1699 SU, Room 1714, Civic Opera Bldg., 20 N. Wacker Dr., Chicago 6, Ill., a son, William Eugene, Nov. 16, 1944.

To Dr. (WASH., '43) and Mrs. J. L. Francis, Rt. 1, Box 428, Enumclaw, Wash., a son, John Loren, Nov. 20, 1944.

To Capt. (Tex., '38) and Mrs. Charles W. Tate, 18th Vet. Evac. Hosp., APO 218, c/o P.M., New York, N. Y., a son, Charles, Jr., Nov. 10, 1944.

To Dr. (Tex., '43) and Mrs. Horace Duckenfield, 308 E. 3rd St., The Dalles, Ore., a daughter, Jane Ellen, Dec. 13, 1944.

DEATHS

D. C. Bassett (Corn., '25), Portland, Ore., died Jan. 9, 1945, at Ft. Dix, N. J. Dr. Bassett was taken ill in France during his service in the Army.

Mrs. M. R. Blackstock, Spartanburg, S. Car., died of a heart attack on Feb. 1, 1945. Mrs. Blackstock had been prominent in association affairs, not only in the South Carolina State Association but also in the southern and national association as well.

J. W. Joss (K.C.V.C., '06), East St. Louis, Ill., died suddenly Feb. 17, 1945. Dr. Joss was inspector in charge of serum production in the East St. Louis area. He was admitted to the AVMA in 1907.

Walter Shaw (Ont., '81), 90, Dayton, Ohio, died Feb. 22, 1945. For a long period, Dr. Shaw was a member of the Ohio state board of veterinary examiners. He was affiliated with the Miami Valley Veterinary Medical Association and the state Association. He was a life member of the AVMA, having been admitted in 1890.

VETERINARY PROFESSION AND THE WAR

The Educational and Training Provisions of the So-Called "G. I." Bill

The following material has been prepared by Dr. H. L. Foust, chairman of the Special Committee on Postwar Planning. It contains information of interest to veterinarians returning to civilian life from service with the armed forces.

It would seem opportune to call attention to some provisions of the "G. I." Bill as veterans from the Veterinary Corps are manifesting interest in certain portions which may relate to refresher and other courses. The bill, Servicemen's Adjustment Act of 1944, Title II, Public Law 346, 78th Congress, contains the following provisions, among others:

ELIGIBILITY

A) Veterans not over 25 years of age at time of entrance into service:
   1) That the person served in the active military or naval service on or after Sept. 16, 1940, and prior to the termination of the present war;
   2) That the person has been discharged or released from the active military or naval service under conditions other than dishonorable;
   3) That the person shall have served ninety days or more, exclusive of any period he was assigned for a course of education or training under the Army specialized training program or the Navy college training program, which course was a continuation of his civilian course and was pursued to completion, or the time he was assigned as a cadet or midshipman at one of the service academies, or, if less than ninety days, that he shall have been discharged or released from active service by reason of an actual service-incurred injury or disability. The ninety days—or less—service need not all be within the period of September 16, 1940, to end of the war, but may include service extending into or beyond such period. (This last provision requires determination of service—incurrence without applying presumptive provisions of Public No. 2, 73d Congress, as amended.)
   4) Any person who was not over 25 years of age at the time he entered the service shall be deemed to have had his education or training impeded, delayed, interrupted or interfered with;

B) Veterans over 25 years of age at time of entrance into service:
   1) Any person who served in the active military or naval service on or after September 16, 1940, and prior to the termination of the present war, if conditions of A 1, 2 and 3 above are met, may receive one year of education or training or a refresher or retraining course at an approved educational or training institution.
   2) A person over 25 years of age at the time of entrance into service must submit satisfactory evidence to show that his education or training was impeded, delayed, interrupted or interfered with, in order to receive training beyond one year.

Veterans who wish further information in regard to eligibility under Part VIII of Veterans Regulation may get it from the regional manager of the Veterans Administration where their claims' files are located.

BENEFITS

The provision is very clear in regard to the benefits accruing to discharged servicemen who meet the eligibility requirements. There does seem, however, to be a distinction between the status of the persons who elect training or refresher courses and those who enroll for regular course work offered by an approved institution. For those in the latter group who have saisfactorily completed one year's work, further educational training may be provided but the entire period may not exceed four years. For those who elect refresher or training courses the benefits are limited to one year or less,

depending upon the length of the refresher course.

APPLICATION FOR BENEFITS

The veteran who believes he may qualify for educational or refresher or retraining training may make application for same by using Veterans Administration Rehabilitation Form 1950. There is a choice of three methods to follow in filing application: (1) with the regional office of the Veterans Administration where the case file of the applicant is located, (2) with the regional office in the state in which the approved educational or training institution chosen is located, (3) with the approved educational training institution selected. This institution will forward the application to the office of the regional director of the Veterans Administration in the area in which the institution is located. Since the number of veterinary colleges is small, probably the handling of the application would be facilitated by sending it to the institution chosen.

TIME LIMIT

The law specifically states: "An application filed before June 22, 1944, the date of approval of Public Law No. 346, 78th Congress, may not be accepted as a claim under the Act. Educational or training courses shall be initiated not later than two years after either the date of the person's discharge or the termination of the present war, whichever is the later. No education or training under this Act shall be afforded beyond seven years after the termination of the present war."

CHOICE OF COURSE AND INSTITUTION

The law reads as follows: "Such person shall be eligible for and entitled to such course of education or training as he may elect, and at any approved educational or training institution at which he chooses to enroll, whether or not located in the State in which he resides, which will accept or retain him as a student or trainee in any field or branch of knowledge which such institution finds him qualified to undertake or pursue: Provided, That, for reasons satisfactory to the Administrator, he may change a course of instruction: And provided further, That any such course of education or training may be discontinued at any time, if it is found by the Administrator that, according to the regularly prescribed standards and practices of the institution, the conduct or progress of such person is unsatisfactory."

DISABLED VETERANS

The Vocational Rehabilitation Program of the Veterans' Administration through provisions of Public Law 16, 78th Congress, approved March 24, 1943, as amended (Part VII of Veterans' Regulation numbered 1(a), as amended) offers also certain types of educational training.

"Eligible veterans are those who meet the four following requirements:

1) That the person must have been in the active military or naval service any time after Sept. 16, 1940, and during the present war.
2) That he or she has been discharged or released from the active service under conditions other than dishonorable.
3) That he or she must have a disability incurred in or aggravated by such service for which pension is payable under law administered by the Veterans' Administration, or would be but for the receipt of retirement pay, and
4) That he or she must be in need of vocational rehabilitation to overcome the handicap of such disability.

A veteran who meets the above eligibility requirements of Part VII, "who served less than 90 days but was discharged or released from active service by reason of an actual service-incurred injury or disability, or who served 90 days or more, is also eligible for the benefits of Part VIII, Title II, Public 346, 78th Congress, and may elect which benefit he desires provided that in the event of such election, subsistence allowance under Part VII shall not exceed the amount of additional pension payable for training under Part VII." For those desiring to avail themselves of the training or education offered under Part VIII, there is opportunity to apply to the Veterans' Administration using Form 1950 and following the procedure discussed in the paragraph above entitled "Application for Benefits."

The source of the material upon which the above was based was (1) a circular entitled "Public Law 346—78th Congress, Chapter 268—2d session, S. 1767, An Act to Provide Federal Government aid for readjustment in civilian life of returning World War II veterans," (2) an information sheet from the Office of the Veterans' Administration, Washington, D. C., entitled, "Educational and Training Provisions, Servicemen's Readjustment Act of 1944, Title II, Public Law 346, 78th Congress," and (3) an information sheet from the Office of the Veterans' Administration, Des Moines, Iowa, entitled "Basic Provisions of the Vocational Rehabilitation Program of the Veterans' Administration, Public Law 16, 78th Congress, Approved March 24, 1943, as amended."

REFRESHER COURSES

In response to recent inquiries, most colleges of veterinary medicine have indicated they have tentative programs of retraining or refresher courses for veterans of the Veterinary Corps. The programs may only become effective when numbers sufficient to warrant forming separate groups for instruction are available.

Such programs vary in length and in content with various colleges.

In the event that but a few wish to take refresher courses, they may enter the classes of regular students for the work they desire. This arrangement is being followed by some colleges at the present time.

There may be those who may qualify under either Public Laws 346 or 16 for more formal training, which may lead to credit toward graduate degrees.

Prospective applicants for the work, which may be offered by the various colleges, should direct inquiries for further information to the colleges in which they desire to do refresher, retraining, or graduate work. The procedure for application to the Veterans' Administration is given in the first portion of this discussion.

Committee on Veterinary Service for Farm Animals Set Up by National Research Council

Taking cognizance of the need for increasing veterinary services for farm animals, the Agricultural Board of the National Research Council recently voted to establish a committee to study ways and means to accomplish the desired end. Dr. Roy C. Newton, Chicago, vice-president in charge of research of Swift and Company, has accepted the chairmanship. Other members of the committee are:

Leland E. Call, dean of agriculture and director of the experiment station, Kansas State College; Wilber A. Cochel, editor of the Weekly Kansas City Star; William A. Hagan, dean, New York State Veterinary College; George H. Hart, head, Division of Animal Husbandry, University of California; Brig. Gen. Raymond A. Kelser, director, Veterinary Division, Surgeon General's Office; John R. Mohler, former chief of the Bureau of Animal Industry, United States Department of Agriculture; A. Newton Richards, vice-president in charge of medical affairs, University of Pennsylvania; Bennett T. Simms, director, Regional Laboratory, Animal Disease Research, Bureau of Animal Industry, Auburn, Ala.; and John G. Hardenbergh, executive secretary, American Veterinary Medical Association.

Veterinary Officer Rescued.—First Lieutenant Ott Herbert Ivan, V.C., of Atlanta, Ga., was among the 21 officers of the Army Medical Department named by the Surgeon General's Office in the first list of prisoners freed from Camp Cabanatuan on Luzon Island. The full list of prisoners, when released, may contain the names of other veterinary officers who were taken prisoner when the Japs invaded the Philippines.

Service Plaque Awarded to Fort Snelling Veterinary Unit

By command of Major General Danielson, Headquarters, Seventh Service Command, the Meritorious Service Unit Plaque was awarded on Feb. 15, 1945, to the 1775th Service Command Unit, Medical Department Detachment (Veterinary Service), Fort Snelling, Minn., "for superior performance and outstanding devotion to duty in connection with food inspection activities for a period of over two years."

The citation further states that: "The outstanding manner in which these inspections are conducted is evidenced by the high esteem that various private industries have for this unit. The superior degree of military and professional efficiency that this unit enjoys was achieved by meritorious individual conduct of its personnel and its high esprite de corps, superior overall administrative record, and outstanding discipline and morale."

Col. Chauncey E. Cook (OSU., '09) is station veterinarian at Fort Snelling.

Capt. Wm. S. Gochenour, Jr. Rescued

The Adjutant-General of the Army notified Mrs. Wm. S. Gochenour, Jr., of Indianapolis, on Feb. 21 that her husband, last reported as a Japanese prisoner of war in the Philippines, had been rescued by U. S. forces, was safe and in good physical condition.

Capt. Gochenour (UP., '37) was taken prisoner while stationed at Fort Stotsenburg, P. I. Prior to entering the Army, he was associated with the Pitman-Moore Co., Indianapolis, of which his father, Dr. W. S. Gochenour, Sr., is director of biological laboratories.

Deferment Procedures for Registrants under 38 Revised

On Feb. 21, 1945, National Headquarters of Selective Service amended Local Board Memorandum No. 115 to make it accord with the plan approved by the Office of War Mobilization governing deferments of men in certain age groups.

On Mar. 1, 1945, the Central Office, Procurement and Assignment Service, issued instructions (Form Letter No. 364) concerning the revised procedures. State veterinary chairmen should handle cases under their jurisdiction in accordance with this directive, which follows.

Subject—Selective Service Classification Procedures for Men Who Were Classified by Selective Service as II-A or II-B on Jan. 1, 1945.

The National Headquarters of Selective Service, in an amendment of Local Board Memorandum No. 115, has revised the procedures relative to the deferment of men under 38 years of age, and has designated the Procurement and Assignment Service as one of the 15 certifying agencies, with the Code No. 15. These procedures will affect: (*a*) civilian interns; (*b*) civilian residents; (*c*) members of the professions on the faculties of universities; and (*d*) members of the professions engaged in private practice or otherwise regularly engaged in an activity in war production or in support of the national health, safety, or interest (those members of the professions who do not meet the requirements outlined in the paragraphs below, presumably, should be considered available for military service and such information should be submitted to selective service on inquiry).

I. Members of the Professions in the Age Group 18 Through 29

A) It is necessary at once for State Chairmen to ask employers (universities, hospitals, industries, etc.) to make out and submit to the State Chairman's office:

1) A list, in triplicate, of members of the professions in his establishment who are in the age group 18 through 29 and who are necessary to and regularly engaged in and are indispensable and irreplaceable in an activity in war production or in support of the national health, safety, or interest. This includes all those who were on Jan. 1, 1945, classified II-A or II-B. For this purpose, a supply of Forms DSS 333 "Employer's List of Registrants" will be supplied to you by the Procurement and Assignment Service for distribution to the agencies under your jurisdiction in your state.

2) Two sets of three copies each of Form 42-A (special-revised) for each registrant.

B) Immediately upon receipt of Forms 42-A (special-revised), the state chairman should, if he concurs that the registrant is essential in accordance with Paragraph A-1 above,

1) Certify by signing the originals only and entering the name and Code No. 15 of the Procurement and Assignment Service as the certifying agency;

2) Forward one complete set of three copies each of Form 42-A (special-revised) to the registrant's local board;

3) Forward to the State Director of Selective Service in the state of employment the original copy only of the second sheet of 42-A (special-revised), along with one copy of the lists (Form DSS 333); and

4) Retain, for his own use, two carbon copies of Form 42-A (special-revised) and the two copies of the lists.

C) For self-employed private practitioners:

1) Have each member of the profession who is necessary to and regularly engaged in and is indispensable in an activity in war production or in support of the national health, safety or interest make out a Form 42-A (special-revised) and submit it to your office;

2) Follow the same procedures as outlined in I-B above and make a list of these cases on Form DSS 333. In these cases, the State Chairman will sign Form DSS 333 over the designation "Signature of Company Official."

II. Members of the Professions in the Age Group 30 Through 33

The same procedure as outlined in I-A, B, and C above will be followed by members of the professions in the age group 30 through 33, with the exception that Forms 42 and 42-A will be used in place of Forms 42-A (special-revised). It will be noted, however, that members of the professions in the age group 30 through 33 must be necessary to and regularly engaged in (but not necessarily indispensable and irreplaceable in) an activity in war production or in support of the national health, safety, or interest.

III. Members of the Professions in the Age Group 34 Through 37

The same procedures as outlined in I-A, B, and C above will be followed for members of the professions in the age group 34 through 37, with the exception that Forms 42 and 42-A will be used in place of Forms 42-A (special-revised). It will be noted, however, that members of the professions in the age group 34 through 37 must be regularly engaged in (but neither necessary to nor indispensable and irreplaceable in) an activity in war production or in the support of the national health, safety, or interest.

IV. Reports to the Central Office

In order for the Central Office to make arrangements for a total United States allowance, State Chairmen will submit, in duplicate, the total number of members of the professions for whom the following forms have been made out:

a) Forms 42-A (special-revised) for men in the age group 18 through 29;

b) Forms 42 and 42-A for men in the age group 30 through 33, and,

c) Forms 42 and 42-A for men in the age group 34 through 37.

NB—The term "interns" above includes all individuals serving in internships whether or not they have received their degree of doctor of medicine.

These procedures are not necessary for individuals who are classified by Selective Service as 4-F. However, do not confuse this with a physical disqualification on application for commission, which is an entirely different thing.

Student Deferment

Par. 9 (a) of Memorandum No. 115 as amended covers procedures for students in medicine, dentistry, veterinary medicine, or osteopathy in recognized schools. Their deferment status is unchanged, but new forms, uncertified, will have to be filed with their local boards. "Present Forms 42A (special), Forms 42A or other occupational affidavits on file for such registrants will be considered as remaining in effect until they are replaced by Form 42A (special-revised) and the cases of such registrants ages 18 through 29 will not be reopened unless the local board has information of a change in the registrant's status or his current deferment has expired."

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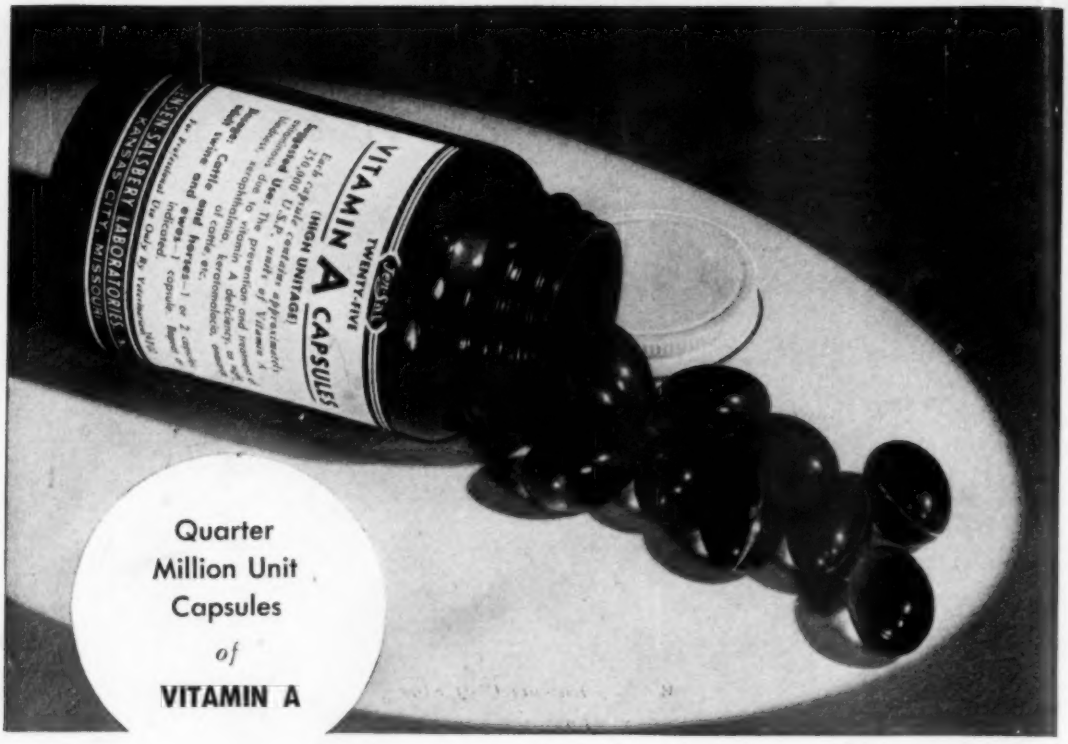

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